ANALOG

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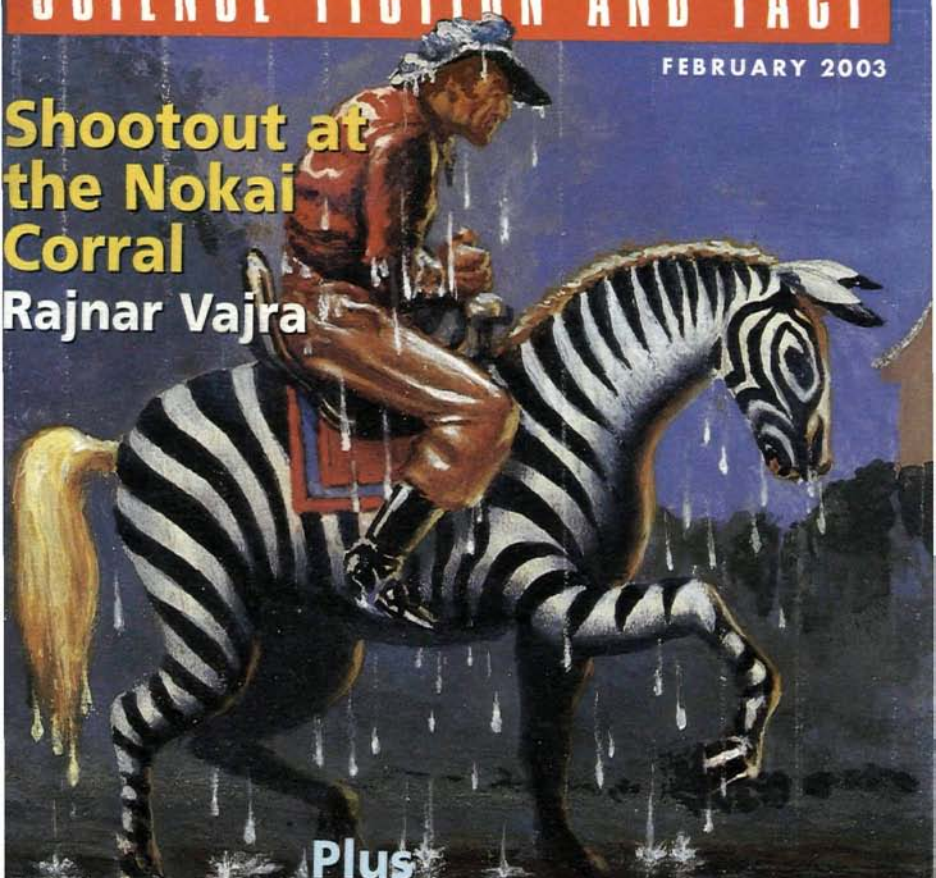
FEBRUARY 2003



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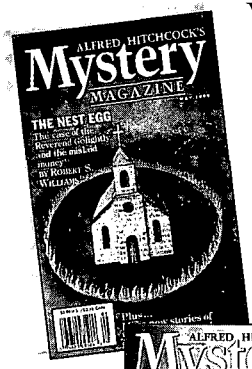

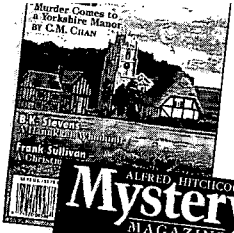

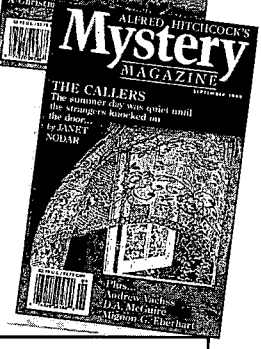

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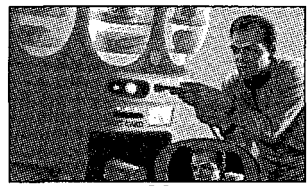

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EDITORIAL Stanley Schmidt

USEFUL ILLUSIONS & DEADLY FAITH

A reader recently took umbrage at my referring to the religious fanatics who destroyed the World Trade Center as "nuts" with too much power at their disposal. Far from it, he said, and he went on to give the strong impression that he actually rather admired them for having the courage to hold a strong belief and act on it—as distinct, say, from Americans who profess some religion but have little to do with it beyond going to church on Sunday. I found this disturbing because it articulated what seems to be a widely held notion that depth or sincerity of belief is an intrinsic and powerful virtue. It isn't, I replied; a strongly held belief is a good thing only insofar as the belief is correct and not harmful to its holder or others.

Is that really true, or a hasty oversimplification? That reader's letter, and my reply, got me thinking about some questions that lie at the very heart of who human beings are and why they act as they do. Why has "faith" *per se* come to be regarded as an admirable thing in so many cultures? What is the survival value of belief in something that cannot be proved? And does a belief really have to be true to be valuable?

Adherents of any number of faiths will undoubtedly object that the value lies not in belief for its own sake, but in *true* belief—which almost invariably means *their* belief. Yet we also have plenty of people like the aforementioned reader who clearly do respect others for the mere act of believing in something—even something they don't personally believe in—strongly enough to take drastic and dangerous action in its name.

We also have the empirical observation that human history has spawned a great many belief systems. Just about any human culture you can think of is based largely on at least one such, and the regard in which its members are held is closely tied to how strongly they profess that belief and practice its tenets. Those sets of ideas can't possibly all be entirely true, because they contradict each other. I will make no attempt to answer the question of which of them contain how much truth. But I will ask whether some or all of them might still serve some useful function even if much of what they claim is demonstrably false.

The fact that they occur in so many cultures suggests that they do—even the ones with relatively little objective truth. If they didn't, societies that have them would have been outcompeted by those that didn't, and faded into obscurity. But what function can an ideology built partly on erroneous concepts serve? If I am looking for a common denominator, a single factor that apparently has evolutionary value for human societies, it must be not any *particular* faith, but faith itself.

Or, more likely, some definable class of faiths. It can't be limited to beliefs that are true in all respects, since many of them are mutually exclusive on some points. Maybe what it takes is beliefs that are shared by many of the people in the group, serving as a sort of cultural cement. That does in fact seem to be

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one of the common purposes of religion: to provide a common body of tradition and a basis and authority for a moral code. It may well be that we have been able to progress even as far as we have toward civilized behavior mainly because the fear of a higher power compels people to make some attempt to behave in accord with what they are told are that power's demands.

But doesn't it matter whether the shared beliefs are true or not? It's hard to see how a society that believed steadfastly that fire doesn't burn and gravity doesn't pull things down could last very long. But then, most religions try to do at least two main kinds of things, one of them central to everyday life and the other far less so, and to link them together in a way that can't withstand close scrutiny. Namely, most religions include doctrines on cosmology (broadly defined) and morality. If you're looking for an accurate account of how the universe and its inhabitants have arisen and developed, you're not likely to find it in theological writings. The most literal reading of Genesis, for example, just doesn't jibe with the wealth of physical and biological evidence we've accumulated.

On the other hand, accurate cosmology has no interest or practical relevance to the everyday lives of vast numbers of people. It simply doesn't matter to them whether they believe a true or a completely fanciful account of how the world came to be. If they can have deep faith in a theology that has a completely nonsensical cosmology, tied to a workable moral code—say, through the claim that the all-powerful entity who created the universe cares what they do on Wednesday or Friday and will punish transgressions—the main result may be that most people behave more harmoniously. That's likely to make the society more stable and enhance its chances for long-term survival.

Moreover, faith that there's a better life after this one—whether there actually is or not—can give some people the strength to survive hardships they would otherwise find unendurable. That's a strong psychological benefit for the individual, and it or something like it has played a frequent and important role in human history.

Of course, it only works for those who *can* hold a strong belief without, or sometimes in direct defiance of, objective proof. Those who can't—those who insist on solid evidence and logical consistency as a foundation for their beliefs—may have to do without this benefit, or find something else to replace it.* But many people don't have that problem. They're quite capable of believing

*Of course, many highly intelligent, educated people are religious, reconciling moral teachings that serve them well with cosmological teachings that don't withstand scrutiny by regarding the cosmology as figurative, rather than literal, truth.

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something because they would like to and somebody they consider an authority tells them it's true. It may well be that most societies have placed a high value on the ability to believe, independently of proof, because such individuals are psychologically equipped to endure hardship—including oppression by other human beings—and are more likely than freethinkers to follow prescribed codes of conduct. And it may well be that this does contribute to the viability of cultures, at least at certain stages of history.

The idea that dogmatic and more or less incorrect belief can have real individual and/or social benefits may be hard for a very rational person who cares about facts to understand and accept. About as hard, for example, as for a conventionally religious person to accept that a strong moral code can exist independently of belief in a supreme being. To many readers of this magazine, I suspect, it's clear that it can and often does. To them, the notion that people can't behave decently without being afraid of punishment by somebody bigger and stronger implies that all people are, in effect, perpetual children. But children are expected to grow up and do right things because they are right, not just because of fear of what somebody else will do if they don't. Maybe species should be subject to the same expectation. It's quite possible to develop moral principles—even some that most people can agree to enforce—by rational consideration of what's good for individuals and society.

But doing that requires sophisticated, subtle, difficult thinking that's well beyond what many people want to (or can) do. Many of them would rather be told what to do, and many societies may well work better if they are. Maybe they really do need to believe in an ultimate authority to enforce good behavior, and the ultimacy of that authority is certainly enhanced if they also believe it to have created the whole world. If what they believe about *how* it created the world is pure myth, most of them will never know the difference, and it won't matter. The cosmology is not the important part of the package; it's there to support what really matters, and until recently nobody could test how accurate it was anyway.

Some of our recent troubles have come from the fact that scientists, beginning at least as far back as Copernicus, have been collecting and analyzing information that does make it possible

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to check theological accounts of creation against what really seems to have happened. This is very unsettling to holders of traditional beliefs, some of whom are determined to hold onto them at all costs. Some also feel threatened because they assume that if some of their beliefs are called into question, all of them are. A particular church's theology typically includes both cosmological and moral teachings. If the cosmology is shown to be untenable, does not that invalidate the morality as well?

No, it doesn't, at least not necessarily; but it may be very hard to get that distinction across to the faithful—or their spiritual leaders. The moral principles may be generally quite sound, but morality plus cosmology has for centuries or millennia been presented as a package. Shake faith in one part of it, and you may well shake faith in all—not because there's really an important connection between them, but because historically they've always been presented as if there were. We may well be in the early parts of an important historical transition in which more people *have* to learn to think about morality as a subject in itself and not just a set of decrees artificially tied to conjectural cosmology.

Meanwhile, we come back to my original question about the extent to which holding and acting on strong beliefs is virtuous. So far I've softened my original claim that such faith is good only to the extent that the beliefs are true: I've acknowledged that sometimes even a false belief can serve purposes useful to individuals and/or societies. The second part—that a strongly held belief is a good thing only insofar as the belief is not harmful to its holder or others—I can only reiterate even more emphatically. The only qualification I can make is that while I may hold the opinion that someone else's belief is harmful to him or her, it is not my business to try to change it if it is harmful *only* to him or her. People are entitled to make their own mistakes, and it may be that *I* am the one who is wrong.

But by the same token, when someone else tries to impose his or her beliefs on me, or to hurt me or my property because of those beliefs, that becomes very much my business. That's what happened at the World Trade Center: A small group of Muslim extremists (emphatically disavowed by most other Muslims) decided that their beliefs justified massive-scale vandalism and murder of "infidels." In that type of belief, no matter how deeply held or courageously acted upon, I can see no virtue at all. Faith that leads to criminal and immoral acts against other human beings is simply criminal and immoral—and this is *not* an anti-Muslim statement. As I have already mentioned, most Muslims also condemned the actions of 9/11; and similar attitudes, though usually implemented on a less extreme scale, are all too easily found in other religious quarters.

At least one Christian minister was suspended by his denomination for participating in an interfaith prayer service after 9/11. A spokesman for the denomination actually referred to the other participants as "pagans," and another minister retaliated (aptly, I think) by calling the parties responsible for the suspension "our Taliban." A reader sent me an editorial from *The Philadelphia Trumpet* (a magazine apparently dedicated to exposing modern science as "a false messiah—about to destroy us all!") quite blatantly envisioning a future ruled entirely by Christians, not "*hampered* [author's own emphasis] by multiculturalism and diversity."

This kind of stuff is scary, no matter who spouts it. Depth and sincerity of belief, and the courage of conviction to act on it even at great personal risk, can indeed be a real and admirable virtue—sometimes even if the belief itself is not entirely accurate. But when that belief leads to persecution of others who don't share it, it is in no way to be admired—or even tolerated.■

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Human history is full of social experiments, but none quite like Paladin, where imitation was just a beginning. . . .

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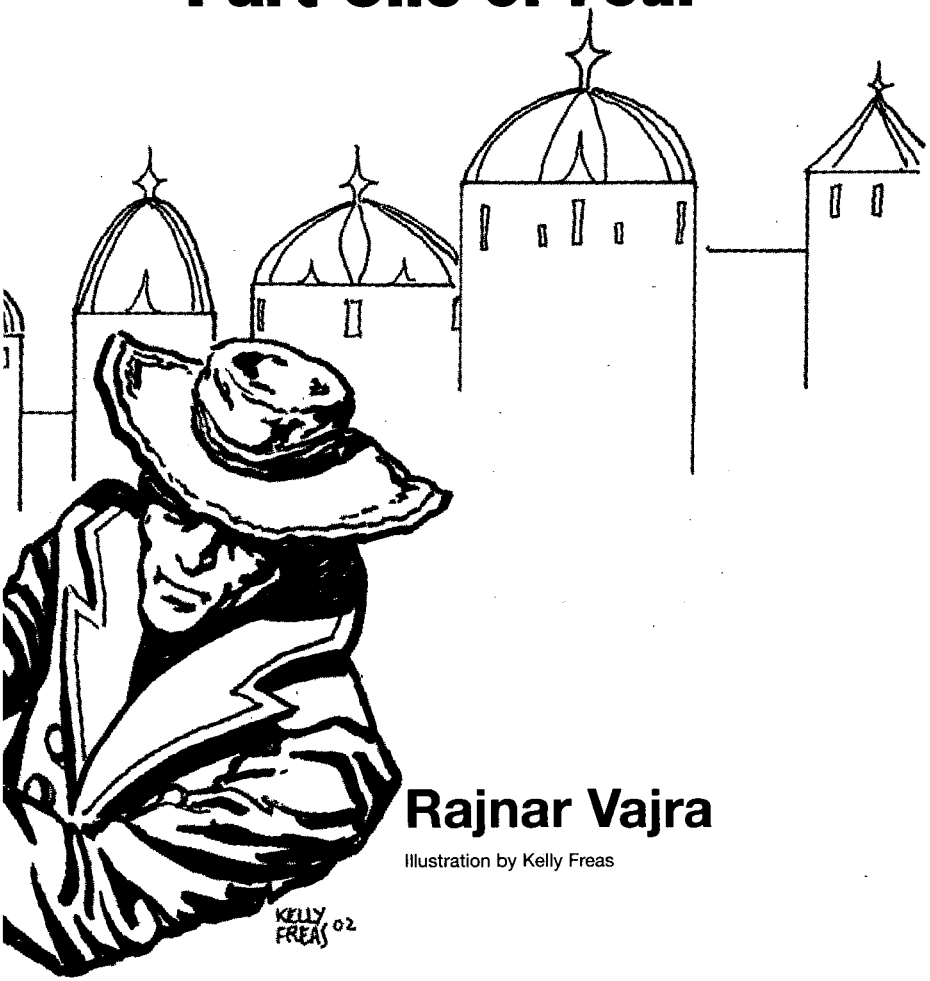
Shootout at the Nokai Corral

Part One of Four



Rajnar Vajra

Illustration by Kelly Freas

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Prologue

On Earth, the year 2066 was unfolding with dull predictability until Wednesday, November 24, when an innovative space propulsion system blew away mundane expectations like a hurricane scattering feathers.

This American-Israeli-Swedish innovation, Bubble Drive, relied on exemption theory (a new branch of physics), subdimensional exchange (temporarily substituting normally extraneous dimensions for familiar ones), and the intrinsic elasticity of spacetime. A moving deformation, or "bubble," in normal reality could be generated and a spaceship, placed in a temporary "exemption," could travel on the deformation's edge, akin to a surfer riding a wave. Since time and space themselves were stretching and releasing, and the bubble-ship was traveling *on* spacetime rather than in it, the spaceship could change location without suffering the ills of acceleration or being limited by Einstein's stingy rules.

Almost overnight, interstellar journeys were more than possible. They were practical.

By the tail end of the twenty-first century, after much searching, twelve reasonably inhabitable planets had been discovered. Humanity should have been intoxicated with a sense of burgeoning adventure and opening opportunity.

But something was terribly wrong. An unexplained mood of near-pathological indifference had spread throughout the human race. Like some devastating antibiotic-resistant bacteria, apathy clung to the human heart and flourished despite all attempts to wipe it out.

Dangerously at odds over what do to with the new worlds, Earth's major governments did something no one expected: they stopped bickering.

No one knew what had caused the global depression, but the new worlds offered unprecedented possibilities for seeking a cure. . . .

* * *

Chapter 1

Framed by dark storm clouds behind him, and drizzled on by the leaden sky directly overhead, John rode his zebra slowly into town. Gusts of tepid wind battered his favorite hat and pressed his jacket tightly against his tired back.

Twelve local citizens, who happened to be outdoors near the south end of Main Street, froze in place as John approached, giving him their unblinking attention. No one in this accidental jury smiled, frowned, or said a word. The random spattering of raindrops and mud-muffled clomps of zebra hooves suddenly seemed almost offensively loud.

Uncomfortably aware of stiff faces turning in unison to track his progress, John kept moving steadily. Welcome, stranger, he thought sadly. Welcome to the fair city of Sunstone.

A dog began to whine in the distance and from even farther away, too faint for any normal human to detect, came the voices of two men arguing.

John could hear each voice distinctly.

He wasn't enjoying any of this. Sensitivity has drawbacks. To him, the town held a brooding air; accumulated fear and anger were like rancid vapors, clogging his lungs and leaving bitterness on his tongue. And everyone kept staring. It took a huge effort to gaze around mildly, pretending to be the sort of tourist who cares more about scenery than about people.

Sunstone was no tourist lure. Lop off a few walls and take away, say, the bank, and you'd be kind to call it anything but a standard village. The tallest edifice had only five stories and most town buildings were right here, lining Main Street like spectators waiting for a parade. Each structure was weathered but tough, constructed to withstand summer dust storms, winter blizzards, Red Clay County's infrequent but ferocious hurricanes and the occasional stray bullet.

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Why is it, John mused, that tiny communities usually cram their buildings close together? Just human nature? Or is it some kind of . . . security issue, a huddling reflex? Do we, subconsciously, feel like intruders on this planet even though we've been here for over a century? He was suddenly tempted to stop and garner local opinions on the matter.

What a *superb* way to make myself more inconspicuous, he thought darkly.

Patience paid off; gradually the townspeople became more interested in the unusual zebra than in John, and he felt progressively lighter, as if human scrutiny carried physical weight. He'd been trying to appear harmless (without looking like someone trying to appear harmless) and apparently, he'd done well enough. But he doubted the crowd would have dismissed him this soon if his steed weren't such a magnificent distraction.

As far as he was concerned, Houston was the most beautiful animal on *any* planet: an elegant, muscular stallion genetically augmented to be larger than a terrestrial quarter horse and a thousand times more colorful. The zebra's coat gleamed molten silver between lightning-bolt stripes of glossy black; Houston's unnaturally long mane was a gold so lavish the genetic recipe had received two patents. The enhanced tail was also bright gold, a shade redder. The long hairs fluttered in the breeze like silk threads.

Soon, Houston was hogging all the attention, giving John a semi-private moment to catch his breath and get his bearings after the long hard ride. More importantly, it meant that no one here had recognized him. He could no longer count on going incognito, even in backwaters like this.

The world slowly brightened and the shadow of John's hands developed photographically on Houston's neck. Instinctively, he gazed up at a noontime sun just now shouldering aside its seasonal gray curtain. The sight was so welcome and unexpected, he forgot all about appearing innocuous.

Fortunately for the public's peace of mind, no one witnessed his lapse. John's steady eyes, the clean amber of good ale, glowed with something more than reflected light. Suddenly, he looked . . . considerably less harmless. But then his expression eased. The soothing warmth on his face was an almost forgotten, pure sensual pleasure. For a few priceless seconds, he simply basked.

"Doesn't this feel *good*, old friend?" he murmured, patting the striped neck affectionately before dismounting. "Maybe things will dry out a little." Cheery words, but by the time John's boots touched the mud, his cheer had evaporated, hints of danger pouring in from all corners of his vision.

Don't react, he reminded himself, as he led his steed toward a promising parking spot to one side of the street, covered by a suspended green awning. You had a hunch this was going to be a bad one before you even started out. All this is merely confirmation . . . not a *surprise*. Stay in character!

Despite this excellent advice, he couldn't help glancing wistfully southwest toward hidden Mount McCurran, three hundred miles away and crouching behind redundant layers of fog, rain, and cloud. Another two hundred miles past that majestic peak was a sleepy town named Wyatt. He'd been in Sunstone three minutes and already he yearned for home.

What was wrong with him lately? Was twelve years of constant worry, twelve years of helping conceal the biggest secret on the planet, taking its toll? Damn right it was! He'd always had a touch of nerves before beginning a new job, but these days . . .

A particularly strong gust caught the back edge of his hat, lifting it high enough to reveal more of John's close-cropped hair. His chinstrap foiled the wind's attempted thievery and the hat settled back at a rakish angle. He barely

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noticed.

So many people seem to think of me as a pillar of strength, he admitted to himself ruefully. What am I really? A pillar of *weakness* from where I sit!

He shook himself internally, hauling his attention to the here and now. This was no time or place to indulge his habit of soul-dredging.

The parking place was wetter then it had looked from a distance; rain had angled its way past the awning. Still, Houston needed food and there were no ungulate-style food troughs further down the street. This spot would have to do. Typical small town economic strategy: scatter a few merchants outside with cheap but tempting wares and place all the guest parking spaces for the more popular animals at one end of town, thus forcing visitors to walk a gauntlet of salesmanship. But no merchants were out today.

John felt Houston's chest to certify that the animal had cooled enough to make feeding safe. Satisfied, he tied the reins loosely to the green-painted hitching rail, studied a posted schedule of fees, and made sure the conveniently placed fodder and water troughs were full and that their contents were reasonably fresh. He scratched behind the zebra's ears before meticulously inspecting its shoeless hooves. A moistened blue bandana made a barely adequate mud scraper.

The first three hooves were fine, but the last had a small pebble imbedded in the genetically improved unguis. The discovery elicited a grunt of concern and disapproval.

"How long have you been walking around with this boulder stuck in your foot, Houston? You know I love you, but I swear to God above, sometimes I think you don't even have enough brains to limp!"

A normal person would have needed a pick and some skill to remove the pebble, but John's bare fingers plucked the stone out with ease. Aside from a trivial indentation, the tissue was undamaged. Sighing with relief, John dropped the hoof, pulled off the saddle and saddlebags, and placed them gently inside a heavily varnished storage bin behind the food trough. He withdrew a towel, horse-brush, and currycomb from one bag before securing the bin's tarred canvas cover. Then he spent ten quiet minutes in grooming duties.

By the time he finished, everyone around seemed to be taking his presence for granted. But he knew it wouldn't last. Indeed, when he put his brushes away and began to stride north along the boardwalk edging the west side of Main Street, people immediately stiffened again with alarm.

Not that John was a daunting figure. He was only six feet two inches tall, a finger's width scant of average male height for a planet whose gravity was 20 percent less than Earth's, and there was nothing threatening about his earnest—perhaps overly-serious—but pleasant face.

Yet he couldn't avoid moving with a liquid smoothness that was as clear a warning in its own way as the rattle of an Earthly rattlesnake. And everyone belatedly noticed that the guns in John's open holsters had costly individualized grips of polished opal.

In a dozen whispers from a dozen suddenly dry throats, one word was repeated: "slinger."

Chapter 2

Project Passion had been conceived to find an answer to the morbid apathy infecting Earth society in the early twenty-second century. Social physicists (those who hadn't become too apathetic to bother) hoped to do this by utilizing the twelve worlds discovered through Bubble Drive technology. Their plan was to set up twelve "theme planets"—each with a modest population and an individually-tailored artificial culture—and study their workings. These cultures were to be based loosely on his-

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torical periods when the human animal seemed especially full of vigor.

Given the project's gargantuan investment of time and money, the Powers That Be insisted that at least one secondary experiment intended to "improve the human condition" should be conducted on every theme planet.

These experiments were mostly social, including group-marriages and circulating ownership; or social-scientific, such as one effort to see if brutally intense education at an early age would create smarter people. Naturally, island worlds such as Treasure and Britannian suggested different lines of research from continental planets such as Vinci and Golden Age.

But Paladin, due to its rule-breaking ecosystem, offered a unique, intriguing opportunity for a different kind of experiment. . . .

Younger than Earth by two billion years, Paladin was rich in undersea volcanoes. Its carbonated oceans nurtured a hardy pelagic phytoplankton that used water-trapped carbon dioxide and nitrogen, volcanic nutrients, and the raw light from Mebsuta for photosynthesis. The happy result was an atmosphere capable of sustaining most forms of terrestrial life.

Before Paladin was discovered, scientists assumed that a planet without a complex ecosystem would never develop an atmosphere breathable by people. All other theme planets had such ecosystems.

And there *was* indigenous life on Paladin, but it was primitive. As usual, bacteria were the most prolific and widespread organisms (although sparse compared to Earth's bacteria). Also, three of its four major continents had areas dense with self-pollinating vegetation and their exotic symbionts: sponge-like creatures absorbing oxygen, releasing carbon dioxide and ozone, and using organically generated electricity to extract key nutrients from the more traditional vegetation.

Finally, on the two largest continents, elaborate jungles of molds and fungi grew underground in fantastic shapes within caverns too vast to exist on any planet with either a denser lithosphere or greater gravity. Some fungi were useful to humans, few were edible. The silver lining was that people and most terrestrial animals weren't edible for local molds, bacteria, and fungi.

Due to underground decomposition, Paladin had certain renewable "fossil" fuels, without the bother of having fossils. But it had no native insect or animal life whatsoever.

Paladin was chosen for the most promising but hazardous of the secondary experiments, one that could have posed a serious threat to higher forms of local life. The idea being to allow settlers only one advanced science, biology, in order to see how far that science could be pushed. With no native insects or animals to preserve, colonists would have free reign to produce all kinds of genetic wonders, including the perilous opportunity to mold a physically superior kind of human. On most worlds, fiddling with human DNA was discouraged or forbidden—here, it was practically mandated. Earth authorities decreed that the risks to local vegetation were regrettable but acceptable.

They seemed less concerned about risks to settlers and tourists. They even *planned* on tourism, hoping it would help defray the costs of colonization. After all, Paladin was relatively tame (theoretically), almost disease-free, and remarkably clear of insect pests (only the lowly flea had managed to slip past inspectors). As a human habitat, its only serious disadvantage was a slightly eccentric orbit around its star, a rare cool G8 supergiant named Mebsuta by the ancient Arabs, meaning "outstretched lion's paw." The eccentric orbit produced impressive annual climatic variations.

But the planet had an asset that would encourage visitors to hazard the exotic

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weather: Paladin was beautiful. Spectacular even.

In particular, the Tenderfoot Continent seemed fresh-minted with its improbably steep mountains and razor-cut canyons. Clays highly tinted with iron, copper oxides, or azurite painted the land red, green, and blue. Gem-quality blue moonstones and golden aventurines were scattered like marbles over the central foothills.

Even Paladin's seas were magnificent. The Acidic and Alkaline Oceans, separated by the elongated geography of Tenderfoot, were two different shades of green, each brighter than any sea on Earth. The sight of Acidic's emerald waters splashing against the ruby cliffs of Tenderfoot's Fang Peninsula suggested two different species eager to mate, but unsure how to proceed.

As time passed, the Earth authorities were pleased. Tourism was very successful. Paladin proved to be a nice place to visit. It also proved to be an exceedingly dangerous place to live.

As John walked along, people kept emerging from stores or homes, and still no one recognized him. He tried to be content with that, but it wasn't his day for contentment.

The sidewalk was wide enough for two people to walk abreast or pass each other without bumping. Still, almost everyone in John's path choose to brave the street's burgundy-colored muck and frequent clumps of soggy manure rather than get too close. He knew it was absurd to take this personally, but the barely covert animosity stung; he'd never managed to grow sensibly thick skin. Also, such excessive caution was another symptom of lethal-grade trouble.

Even more definitive: except for the hotel, every building in sight had solid bullet-shutters covering its main windows.

Closed shutters were a strange sight during rainy season. In fact, low-light-induced "rain fever" would have surely become a local epidemic but for a remarkable fact: most buildings here were equipped with at least two uncovered windows of a very rare type. John had initially assumed that these were merely plain round windows. Then, as he looked more carefully, he recognized the clear, slightly convex "viewports" once used on deep-spaceships. Viewports, made of ultra-dense wolfram-carbide plastic and hardened with boron nitride, had long been nearly unobtainable. Most towns were lucky to even have one.

Their diameters ranged from two to four feet and John presumed they'd been scavenged from the original transport vessels that had carried humans from Earth to Paladin, a modest journey of thirty-three parsecs. The bloated starships had been cleverly designed for easy disassembly so that they could be reassembled into homes, offices, and warehouses for the new colony. And they always came equipped with windows.

A view of some sort, as John understood, was a psychological necessity for lengthy space flights, but virtual windows required too much power to be practical for long journeys. The bubbleships of the previous century took their sweet time. . . .

How had so many of these pricey artifacts wound up in *this* obscure little town? Some wandering retailer with astonishing luck, a supremely sturdy cart, and a team of giant oxen must have offered one hell of a discount!

The good people of Sunstone had mounted most of the viewports as high clerestory windows and left them unprotected since they were, to put it mildly, bulletproof.

Belatedly, John noticed an oddity far more unsettling than the viewport mystery. From where he was standing, he could see at least twenty people wandering about town, but only one was female and none were children. That wasn't right. John had looked up the figures

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on Sunstone taken a year ago in the last Tenderfoot census. The town had more women than men and a good supply of infants who should be toddlers by now.

If the women and children were hiding somewhere, why was *anybody* outside, rather than shivering behind locked doors?

Dana Langhorn Rider, owner and operator of the Sunstone Saloon and Grill, didn't believe in hiding. She was standing in front of her saloon, enjoying this unusual break in the weather. She had work to do, but she couldn't bear to miss even a moment of sunshine, so precious in this dreary season. The street had become beautiful to her, glittering with countless tiny suns, reflections in countless beaded water-droplets. She saw the unfamiliar slinger approaching, but it went against her policy to act afraid.

Dana was a willowy, athletic woman in her middle thirties in standard years, dressed today entirely in green. Her parents had made the unusual decision to alter her genes toward wavy blond hair, clear turquoise eyes, and fair skin. She'd been modeled on the heroine Grand Marshal Diana Vorhees, or at least, considering how easily artists can top geneticists at enhancement, on how Vorhees had been depicted in posthumous oil paintings. Unlike most inhabitants of the theme planet Paladin or the human race in general, Dana showed barely a trace of her Asian, South American, or African ancestries.

Nevertheless, and despite her nose being a trifle long, her cheeks a bit lean, and her mouth perhaps a touch wide, the exotic combination was attractive. While Dana looked too real and wholesome to apply the word "glamorous," her face had an extra, hard-to-pinpoint charm that was part raw vitality, but mostly innate good humor. Faint lines of heartache etched into the corners of her eyes and between her eyebrows only added depth to her expression.

Grief and pain can erode a human face, turning it sour, but Dana had always refused to let her sorrows ferment to bitterness.

When he drew near the oversized swinging saloon doors, John tipped his wide-brimmed hat politely to the tall blond woman, but didn't allow himself to slow down.

Even the saloon had its ground-floor windows covered. As Dana stared curiously at the back of John's head, he acted on impulse. Without deviating from his steady progression down the sidewalk, he casually pushed the nearest saloon door in passing to get a quick glimpse inside. Zigzag scorch marks defaced the rough floor, which seemed to be constructed entirely of genetically hardened wood: stone maple. John's eyebrows tightened in puzzlement and his stomach tightened with foreboding. The place was empty, except for a wizened bartender who gazed at him morosely until the door swung shut.

Now that's interesting, he told himself as he walked along. What in the world could've burned *that* floor, and in such a distinctive pattern? And why do I have such a bad feeling about it?

Ten yards past the saloon, he came to a narrow road intersecting Main Street. A small, four-way street sign was mounted on a tall iron pole and John stared at the sign incredulously. This muddy little pathway was named "River Boulevard" and despite everything, the incongruity was outrageous enough to spark a twinkle in John's eyes.

In fairness, he had to concede that River Boulevard was a major thoroughfare compared to other streets that touched Main. These little tributaries were merely covered alleyways used as reserved parking spaces for the residents' various steeds. But every one of the miniscule alleyways had its own street sign.

People here, he decided, seem to be big on keeping folks from getting lost. If

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only they were equally fixated on the value of drainage!

His heart sank as his eyes traveled farther down the pole. The iron wasn't painted and healthy as he'd first thought; it was sick with rust. Very odd considering that Red Clay County was famous for its large deposits of mercury sulfide—natural cinnabar. In some places, the ground was virtually made of rustproofing.

John picked up his pace.

Twenty yards down the sidewalk past River Boulevard, Sunstone's hardest-luck case, Coby Patterson, was sitting on a mildewed wooden bench. Like Dana, he saw John coming and refused to budge; but his immobility stemmed from sheer belligerence.

Coby was a large, buck-toothed young man whose most prominent feature was an absence: a missing arm. His attitude toward all slingers was one of bitterness and fear. Fear normally predominated.

Today, the one-armed man had encouraging company. Beside him on the bench, in a tall glass bottle that had once held decent whiskey, was a homemade brew so potent, the fumes alone were killing the tough Paladin mildew nearby. As the stranger passed the bench, Coby's hatred of slingers flared up uncontrollably. Without thinking, he emptied the bottle in one huge gulp and hurled it at the back of the stranger's head.

Through some inebriated coincidence, his aim was perfect. And his good arm had hypertrophied enough to make the throw surprisingly powerful.

But the missile was aimed at a top slinger. John heard the gulp and the whip of an arm through the air. He let his ears alone track the projectile. At the last possible instant, without looking, his hand snapped behind his neck and caught the bottle before it struck. He turned briefly, gave the man a cool glance with raised eyebrows, and continued on his way. Without slowing down and again without looking, he tossed the bottle backwards with a gentle underhand flip. It spun through the air once and settled beside Coby, landing perfectly on its base. It wobbled a few times and came to rest. Upright.

The one-armed man stared at the bottle as if it had become something hideous. The precision and delicacy of the toss seemed to defy the laws of nature. Coby was mortified at his own suicidal rashness and irrationally furious that the slinger hadn't even considered him important enough to punish. The bastard had even returned the *ammunition* as if daring him to throw again!

Coby's ruddy face became even redder as he glared at the stranger's receding back, reliving this latest humiliation over and over, each time adding it to an already mountainous pile.

But this time, he promised himself for the ten thousandth time, I'm going to fucking *do* something about it. . . .

John hadn't been tickled by the encounter either. It was just more proof that something was abysmally wrong here. The way the man had looked and smelled suggested long abuse. Under normal circumstances, small towns like Sunstone worked hard to keep their citizens healthy and productive; they couldn't afford to waste their meager human resources.

Why in heaven's name hadn't the drunk had his arm regrown? From the uneven shoulder-development, it was evident the amputation had happened years ago. A patch of haze smothered the sun, and even the sky seemed to brood.

The sheriff's office was near the north end of Main Street. A large gravity clock with a long pendulum was mounted on its sloped roof.

John opened the office door gently and no wider than needed. He silently eased into a medium-sized room illuminated by three viewports and two man-

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tled kerosene lanterns. Despite soffit ventilation, mixed aromas of kerosene, gun-oil, sesame-oil, garlic, cooked sausages, and tank-grown leather thickened the air. A big desk squatting near the middle of the wooden floor supported three tall piles of papers held down by massive, clear quartz crystals. A futon mattress inhabited one corner with blankets neatly folded. Another corner was equipped with a small kitchen including stove, sink with a few dirty dishes, and refrigerator.

Electric motors were illegal on Paladin (except in the industrial city of Buildem in Double New Mexico), but gas-powered refrigeration fell into a gray area shielded by array of useful loopholes.

The man wearing a Red Clay County sheriff's hat, Chou Larker, was two inches taller than John and far heavier. He had his broad back almost square to the entrance and was practicing quick-draw *katas* before a narrow full-length mirror, concentrating so fiercely that he hadn't noticed the moment of increased light from the door opening; his own reflection hid the slinger now standing behind him. Unknown to Larker, John spent a minute observing the sheriff's martial arts moves with a professional and preternaturally quick eye.

Each draw took about two hundredths of a second—not bad at all. On Paladin, gunplay had evolved into an art. Like a ballet performed by a gifted dancer, the sheriff's movements were a clear expression of individual character and emotion. His basic decency, courage, and sense of duty were palpable, but his stiff posture and rigid shoulders insinuated frustration and growing despair. John also knew something about duty and despair, and found himself warming to the lawman even before getting a look at his face.

Don't prejudge, he reminded himself harshly.

The sheriff began working on his double-draws; his left hand was just a whisker slower than his right. John nodded approvingly. Larker was remarkably quick and agile for a large man two shades overweight, who clearly hadn't been blessed (or cursed) with high-powered artificial genetic endowments. But he wasn't in the same league as even a low-level slinger. And even with a mirror, no slinger would dream of standing for so long with his or her back to an outer door.

A collection of mostly Japanese-style "antique" swords were mounted on one wall along with a few throwing-stars, a fine set of rosewood *nunchaku*, the kind of short staff called a "jo," and other and more exotic *kobu-do* weaponry. All were superb reproductions.

John waited until both guns were resting in their holsters before he spoke. "Hate to interrupt, Sheriff, but I understand you wanted some help?"

The soft voice made the man flinch. Yet he was wise enough to leave his revolvers where they were while turning around.

Larker was fifty-five standard years old (sixty-one Paladin years). Good genes, telomeric rejuvenation, and an instinct for avoiding direct sunlight helped him look no older than forty. On Earth, with its citizens aged by a much closer (although far smaller) sun and higher gravity, he could have passed for thirty. His blunt features and slight epicanthic folds managed to smoothly bridge China and Texas. His gaze was direct and no-nonsense. His cropped hair, all that wasn't hidden by the hat, was jet-black with specks of gray. His small ears stuck out from his head as if there were hands cupped behind them.

For a moment, the lawman regarded his visitor with a touch of annoyance. Then his dark eyes slowly widened as his jaw dropped. He took in the stranger's perfectly balanced stance, thick wrists, long delicate hands with oversize knuckles, the unlikely gleams of colored fire in the pistol grips, the lightweight boots, and the shiny traces of graphite lubricant on the inner rims

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of the holsters.

"By God," he said in awe, "you're not wearing a badge and you look younger than I would've thought, but you've simply *got* to be Tornado Carter!"

It was John's turn to be startled. "Hardly, Sheriff! I just work for the man. I'm one of Tornado's Dust Devils; the name is Jonathon Morrow Davies."

"Davies?" The room brightened as the sun reemerged. A stray beam through a viewport invoked a bright spot within one of the big crystals on the desk. A faint, broken rainbow splashed itself against the back wall. "*Silver* Davies?"

"Some call me that."

Larker stared anew. He'd heard outrageous tales about Silver Davies, tales only the gullible would take seriously. Such as how he'd earned the nickname "Silver." Supposedly, someone could throw four or five dimes high into the air while Davies had his back turned. Then he'd whirl around and shoot, bending every one of them all to hell. From two hundred yards away. But now that he was face to face with the man, looking into eyes that seemed to emit light like freak amber rubies, he wasn't so sure the stories were exaggerations. And if a living legend like this was merely one of Carter's lieutenants, what was Carter *himself* like?

Chapter 3

"Real glad to meet you, mister," Larker said sincerely. "I'm Chou Larker, but I guess you figured that out already. I know you top slingers don't like to shake paws—can't risk the fingers, I suppose—but I don't feel comfortable with any man without a shake. Just the way I was brought up. What do you say?"

John held out a hand without hesitation and clasped the sheriff's with a firm but not crushing grip. All at once, he felt as tired as he was.

"Mind if I sit? I've been riding day and night to get here and the way my back feels—I'm trying to remember if my steed was carrying me or vise-versa."

"Of course, of course. Take any chair you like. Hell, take two: one for your feet. Don't know why you slingers always use those flimsy saddles. Give me a deep padded seat, a cushy cantle, a lazy antelope, and I'm happy. Can I offer you anything?"

"No, thanks. I'm—"

"There's a toilet and sink through that door and down the hall. Also, there's a jar of healall around somewhere if you've got sore spots. Me, I'd be one solid blister if I tried to ride for more than four hours at a stretch."

"I'm fine."

"Suit yourself. When will the other Dust Devils be showing up?"

The slinger's mahogany eyebrows lifted, but he let the question hang while he effortlessly set a heavy wooden chair against the best wall for observing the room and its two doorways. He settled into it, allowing himself a murmur of pleasure; the unpadded oak seat felt like opulent luxury. It wasn't bouncing up and down and it wasn't *convex*. Slinger saddles, he had to agree, really are miserable, but they're easy on the steed and allow a rider to be creative in an emergency. The room seemed to be swaying gently, a residue of his long ride. Larker perched himself expectantly on the back edge of his desk.

John tried to appear relaxed. "Tell me, Sheriff, why did you ask for us rather than some other enforcement agency?"

"Well, Carter has his reputation. I asked around, sent Equus Express inquiries to every sheriff west of the Sierra Paladias. Everyone said you guys were the way to go."

"Um. What they probably meant was that we were the agency most likely to be available on short notice; we seldom accept long jobs. But I'm not sure you fully understand our situation. I'm Tornado's—think of me as his booking agent. Before Tornado commits himself to help you, you've got to convince me that your town needs us more than a

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dozen other places."

Larker's forehead bunched and veins in his neck bulged as he jumped to his feet. "Are you *serious*, Davies? I thought any decent law slinger would just . . . come and pitch in here if I asked *nicely*. Want me to get down on my knees and beg? I will if I have to!"

"No. I just—"

"Then what the hell's wrong with you? My town is chin-deep in lion shit and the lions aren't going away! Maybe you don't care? Maybe you're—are you worried about your damn *fee*? We've got the money if *that's* your problem—had to hide it pretty good, I can tell you."

John recoiled internally at the man's vehemence, but kept his own tone cool. "Money is the smallest part of this, sir. And I do care about your situation; I wouldn't have come all this way otherwise. But you've got to understand something. You're not the only one with troubles."

"What does that—"

"Hear me out for just one minute. These days, the whole planet seems to be riding straight to hell." John studied Larker's furious, honest face and spontaneously decided to tell him far more than he'd planned to; probably more than was wise. But—damn it!—wasn't it high time to start gathering allies *outside* the agencies?

"Sheriff," he said, lowering his voice. "Are there any proctors in or near Sunstone right now?"

"Proctors" were investigators from Earth who made frequent visits to Paladin, ostensibly for pure research, although everyone knew their real job was to keep the Paladin experiment on track. Most proctors claimed to be psychologists or sociologists, but they tended to have hard, suspicious eyes seldom seen on social scientists. They were rarely polite, usually intrusive, and invariably traveled with a swarm of guards who carried terrestrial armament of such recent vintage that few colonists had the faintest idea what form of death they might emit.

Larker's eyes flickered. "No proctors. Not last I looked. They don't usually come poking into our business during rainy season, if you know what I mean."

John nodded; he'd often suspected that Earthlings were part cat: they hated getting wet. "All right, Sheriff. Can you keep a . . . an *immense* secret?"

"Depends. You mean from the damn proctors?"

"From everyone. Everyone except marshals, and I do mean everyone. I'm going to take one hell of a chance on you and tell you something you won't like."

"Something you don't want Earth to hear about? Go right ahead!"

The slinger took a deep breath. "There aren't nearly as many private law-agencies as there once were."

"*What?* You're full of crap, Davies! The list of active agencies is as long as your—"

"They're listed. They're just not all . . . functioning anymore, and the situation keeps getting worse. Those of us who remain are getting spread pretty damn thin."

Larker just stared at John for a moment. "What are you saying? Exactly how many agencies *are* 'functioning'?"

"Let's put it this way: if things don't turn around soon, before you know it the only law will be local law."

"Buddha's balls! That would be like having no law at all!" Larker's antagonism collapsed, making him appear to deflate. He abandoned the desk, grabbed an empty chair, turned it to face John, and lowered himself into it as if his bones had become fragile. "When the hell did everything get so rotten?"

"It's been coming on for awhile."

"Yeah? So, just what am I supposed to do now? Sheriffs like me, even with a large fistful of deputies, which I *don't* have, are no match for slinger bandits and their goddamn gangs. We *need* you pros."

"I know it." Against John's will, the

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admission had come out as a groan. "But there's only so much *we* can do. Just last month, we lost another good team. The Bullets got ambushed."

"No! Dakota Bill's outfit?"

"Right. Apparently, only Dakota and two of his people survived. And that was one mean crew."

One of the kerosene mantles was beginning to soot up, and Larker bought some thinking time by standing up and sprinkling a pinch of salt down the lantern's glass chimney. The soot burned off rapidly, but the sheriff hesitated, gazing worriedly into the soft light, before sitting down again and turning back to his visitor.

"I hadn't heard about Dakota Bill. Met the man once. Seemed like a decent fellow."

"He is. I'm glad he's still with us."

"Is that what's happened to the agencies? Ambushes?"

"You got it. We've been—" John was almost whispering now "—losing one or two top outfits each year. This has been going on for more than a decade."

Larker whistled softly. "One or two a *year*? Paladin year?"

"I'm afraid so."

"Lord Buddha! This can't be true."

"I've been trying—actually, this was Tornado's idea—to set up a conference where every remaining enforcement group on the Tenderfoot Continent can get together and hash this problem out before it's too late. Maybe something will come of it, I just don't know."

The sheriff closed his eyes for a moment and rubbed the back of his neck with a large, callused hand. "How the hell have you marshals managed to keep this under wraps for so long? Hell—I can't believe you let me in on such a secret!"

That makes two of us, John thought.

"Ten years, you say?" Larker asked.

"Closer to twelve, actually. And the ambushes were more frequent at first."

"I don't get it. Those assassins have to be nuts! Doesn't the Charter mandate a minimum number of agencies? If Earth gets wind of this, they'll—well, we'll *all* be screwed, outlaws and honest folks alike. Everyone knows what happened to Treasure!"

Treasure was an oceanic theme world with a million islands and whose theme involved buccaneers, privateers, three competing merchant empires, and pirates. Then, one bad day, its merchant kings declared full autonomy. . . .

John nodded grimly. "That's why I don't sleep nights. We wouldn't even get to keep an *illusion* of independence. We'd be crushed under Earth's thumb, and hordes of marines with . . . alien weapons would show up to keep us from squirming. I agree with you: the ambushers are nuts. Since Earth wouldn't want troublemakers around, the *first* order of business for the marines would be to track down and wipe out the gang behind the attacks."

"You believe there's a single group involved?"

"Bet your life savings on it. The pattern is too consistent to be anything else."

Larker looked like a man who'd just fallen into an invisible chasm. "So what kind of stupid assholes would take such a risk? What could they hope to gain in the long run?"

John nodded. "Tell you what: I'll give you my right eye for the answers. But we've jumped the rails here. Let's deal with Sunstone's problems first. A good friend of mine, Joe Li, says that the way to fix a broken bowl is to put the small pieces together just right. Maybe later we can talk more about the . . . entire bowl."

"Fine by me. Small pieces, eh? I like that."

"Look, Sheriff: I wouldn't be here today if your letter hadn't, um, suggested that Sunstone was where I needed to be. You write an effective message, sir. 'Emergency in Sunstone. Outlaws. Come at once.' But I could use a few details."

Outside, a particularly thick cloud

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shrouded the sun and the room filled with shadows. Larker shivered a little, trying not to gape at his visitor. The man's amber eyes seemed, if anything, even more luminous than before. Slinger eyes. What could Davies see that he couldn't?

John leaned closer to the sheriff purposefully. "So let's get right down to it. Why should the Dust Devils risk our lives here rather than somewhere else?"

Larker had to clear his throat before he dared trust his voice. "Ever heard of Dirty Jake?"

John spread his hands. "Who hasn't? Assuming we're talking about the outlaw chief. As I recall, his gang started out by raiding folks down in Gloomy County in New Arizona."

"That's what they say."

"But they vanished long before any marshals could get there. Same thing happened in Verboten, I think it was, and then again in Wild Springs and Mica and a dozen other places since. Odd way to operate if you ask me. Rob and run. Some folks just don't know how to settle down long enough to milk a town dry. Don't tell me *he's* your problem?"

"He's a problem all right. And I've got news for you: he's learned to settle like a damn homesteader. He's been nearby for over six months. Started raiding us three months back." Larker worked his mouth as if he tasted something sour. "You're not the only one taking a chance, Davies. I waited so long to scream for help because Jake threatened reprisals if I called anyone in. Besides, I'd heard that if you grit your teeth and bear it, he'll soon find some other town to screw. So I learned something the hard way: don't believe everything you hear. But I'll tell you two things I'm damn sure of. He's not your typical gang-boss and he wasn't always called Dirty Jake."

The slinger leaned back in his chair and looked across at Larker with an odd, wry expression. "Well, that last part is kind of a relief. What sort of person would name their kid 'Dirty Jake'?"

As the sheriff considered his own words, his lips twitched. "True enough," he admitted. "Might even qualify as . . . bad parenting." An infectious grin suddenly spread across Larker's wide face, wiping clean months of worry. John couldn't help but smile back, but he noticed that as the sheriff's grin faded, the worry was waiting.

"But Jake's parents aren't at fault," Larker continued, "His original name was evidently William, as in William Caine."

Suddenly, John was sitting bolt upright, his face a frozen mask. "What are you—"

"You recognize the name."

"Hell, the whole planet knows *that* name! Bill Caine is the man who—wait. You're talking about some other William Caine, right?"

Larker studied John soberly. "What makes you so sure?"

"Knock it off. Grand Marshal Caine died fifteen years ago. People are always visiting his cenotaph, heaping flowers on it. Been there myself. Sometimes I—never mind. Tornado still talks about Caine's Twelve Shooters from time to time and how good they were."

"Wasn't Carter a Shooter himself for awhile?"

"For two years. Maybe that's why what happened to them . . . still bothers him. And as I said, that was fifteen years ago. They were ambushed like the Bullets. Maybe I should count *that* as the beginning of our long troubles, but there was a three-year gap before the next ambush. The way I heard it, Caine was killed on the spot. The few remaining Shooters disbanded a few days later."

"Yep. That's the story. But what if I tell you a story is all it was?"

A cold wind seemed to blow through the pit of John's stomach. "Are you saying he *wasn't* killed?"

"I have reason to believe that William Caine has been calling himself Dirty Jake

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for at least ten years now."

"That's a damn lie!"

"I'm afraid not. And he's put together the worst gang of murderers and thieves and rapists on the planet. They—"

"Hold everything! You're claiming that the best of the old law-keepers turned *bandit*?" John's voice was raspy from his effort not to shout. "I don't believe you. And Lord above, you'd *better* be wrong. Caine was—he was supposed to be something very special. What the hell makes you think he's this Jake?"

"One of my Indian buddies, Shining Wing Krishna, chief of the Paladin Anasazis, knew him from when they were schoolboys. That was out in Double New Mexico. Apparently, Caine is . . . deeply disguised, but Shining Wing is—well, he's sharper than any sword on *my* wall."

"He's wrong." John's attempt to sound confident had backfired. Against his will and all reason, he was starting to believe.

Larker smiled grimly. "You or I could be mistaken, Marshal, but not Shining Wing. That man is a wonder. 'And still they gazed, and still the wonder grew, that one small head could carry all he knew.' "

John glared at the sheriff. "What is that crap?"

"I've—I've got this book of famous quotations from Earth." To John's surprise, the sheriff was blushing. "Ever hear of Robert Burns?"

"Burns? I don't think so."

"Forget it. Like I was saying, the Mudslingers—that's Jake's latest gang—moved near Aurado six months back. Aurado's an easy twenty-minute ride southeast from here. I swear to you, Davies, they haven't just been 'milking' us, as you put it. They've been *bleeding* us—all of Red Clay County, really—riding into our town twice a month and just taking whatever the hell they want. So far, they've only showed up after dark."

"Ah. That's why your people feel safe enough to be out in the daytime?"

"Yeah. We've even stopped posting a day-sentry; everyone's getting too damn tired to bother. But nobody feels any *too* safe. With someone like Jake, you never know."

"I also noticed there weren't many women around."

Larker's eyes darkened. "And we keep our boys at home. Girls and younger women, we had to send clear out to Spitting Gulch. When I said Dirty Jake had collected rapists, that wasn't a goddamn figure of speech. Also, we're beginning to run short on various necessities and it helps to cut the population until things improve."

"I see."

"There's something else. My gut says that Jake is deliberately putting pressure on us, but not just to torture us. And I've had some evidence. Aside from the usual raids, he's taken to showing up sometimes in the dead of night with at least twenty outlaws. They ride through town, shooting and cussing. Then they gallop away. I think he's trying to scare us into doing something . . . specific."

"What?"

"God knows. Meanwhile we're getting close to the bone here and it's even worse for Shining Wing's people, who are down to the marrow. The Anasazis have top-notch gardens, but no growth tanks. They depend on us for certain staples. And, like I said, we're running short. But you haven't heard the worst part yet."

"Go on," John said quietly, alarmed at the new tone in the sheriff's voice.

"Somehow, Jake cut a deal with some asshole off-planet. Somebody managed to slip him a high-energy weapon. It's a real antique, but no toy."

As John considered the implications, he unconsciously clasped his hands together under his chin as if in prayer. For an instant, he looked much older and, at the same time, like a scared little boy. Then he pulled himself together so fast, the sheriff could almost hear a snap.

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Larker had a sudden insight and his respect for his guest skyrocketed. Here was a man, he thought, who wasn't immune to fear; he hadn't conquered it or trained himself to ignore it. Instead, he'd learned how to make fear work *for* him. He used it like a springboard, rode on it as if it were an invisible steed. Larker could only imagine what Silver Davies could be capable of.

John forced his body to unkink. All the tense muscles in the world weren't going to solve *this* problem. "An energy weapon, you say. That's . . . unfortunate, Sheriff. But maybe it explains something I noticed earlier. Shortly before I met you, I peeked into that saloon down the street. Those burn marks—"

"Weren't made by toasting marshmallows," Larker confirmed.

"And that floor looked to be high-grade stone maple. It would take something special to char it. Is Dirty Jake *suicidal?* What's going to happen to him when some proctor walks into the Saloon?"

Larker shrugged uneasily. "Don't know for sure. But when have proctors shown interest in anything but people?"

"You have a point."

"Hell, from what I've seen, proctors wouldn't know stone maple from paper pine. And even if they ask questions, who'd give 'em the time of day, let alone say something that might bring them here . . . in droves? You've heard the stories. They show up, take over your town, and treat everyone like slaves until they're satisfied a problem is gone. And sometimes . . ."

John's fists clenched. "Sometimes they're never satisfied. Those aren't just stories, Sheriff."

"That's why coping with Jake beats dealing with Earth. Barely."

"But that floor still seems like a red flag to me. Wouldn't the marks themselves imply an Earthly weapon to anyone from Earth?"

"Not necessarily. That particular weapon has been obsolete so long, most proctors probably never even heard of it. Hell, if they question Dana, she can always claim that one of her lit oil lamps broke. Someone who doesn't know about stone maple might swallow that."

John's eyes narrowed. "Sounds like you know precisely what we're up against."

Larker nodded. "One of those portable plasma cannons they banned on Earth about a century ago."

"Lord! I don't know squat about plasma cannons. Who the hell does?"

"As it happens, I do—maybe even squat and a half. Antique weapons are my hobby, Marshal," Larker waved his hand at the exotic wall-mounted arsenal.

John frowned. "Swords, I can understand, but how do you know about antique energy weapons?"

"Dumb luck. Got an Earth buddy, a starship pilot, who visits Paladin sometimes. He ferries proctors between Earth and Paladin and he—"

"A proctor pilot?" John said thoughtfully. "Not, by any chance, Captain Sir Gregory Tormuelson?"

"No. Who's he?"

"Someone I once knew. Guess the galaxy isn't *that* small. Sorry to interrupt; please continue."

"*My* friend's name is Murphy Clemens. Visits me and the wife every few years and brings along magazine articles he thinks I'd find interesting. I've got a stack of articles this high about power weapons."

John nodded judiciously. "That's good news! In fact, it may be crucial. I'll definitely have questions for you later. But for now, I've heard enough." With a hint of formality, he pulled his marshal's badge from a pocket and pinned it to his jacket. The badge was a seven-rayed platinum star with a gold overlay suggesting a whirlwind. "I'm officially on the job and I'll send for my partners immediately."

"Yes! *That's* what I wanted to hear."

"How many people does Jake have

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working for him, total?"

"Hard to say. Maybe forty." For the first time, Larker seemed slightly evasive.

God help us! John thought. "How many are top slingers?"

"Only six or seven."

"My Dust Devils only have five top slingers. Seven is more than plenty. Do you know any names?"

"Hell no! They haven't exactly been sociable."

"Any distinctive features or unusual physical enhancements?"

"Mostly the usual. One outlaw has a neck you'll have to see to believe."

"Extra long? Probably Harry the Neck. Damn. He used to be on the right side of the law, working for Hard Nose Rose. Any other oddballs I might recognize from their descriptions?"

"Not really. Well . . . one has kind of a beak. Another has skin like a lizard. I guess those enhancements aren't all that rare."

"I'm afraid not. I'm just going to call in our key players for now: Lo Pan Li and his wife Lilly, Henri Jacques, and . . . the boss. My agency doesn't have the personnel to fight forty soldiers, not if seven are top slingers. Lord, no. And trust me; you don't want such a war happening anywhere near Sunstone. And that's not even considering that cannon thing. So, we'll have to win some other way . . ."

Larker couldn't put his finger on what had just changed in John's expression, but he was abruptly very glad the slinger was on *his* side. "Looking at you, Marshal," he said, "I'd bet you never learned the fine art of failing."

"Thanks for the vote of confidence. I think. At least you happen to be in luck in one way. The Dust Devils just finished up a job and my crew can be here within a week."

Larker's eyes bulged. "*Less* than a week? That's fantastic! Better than I'd dared hope for. But how the hell can you get word to them so fast? I understood you people were headquartered near Wyatt, and isn't Wyatt—Buddha!—isn't Wyatt over five hundred miles from here? They haven't set up a new branch of the Teakettle when I wasn't looking, have they?"

"Come with me, and I'll show you how Dust Devils communicate these days. I brought something with me you may find—well, you'll see. Why spoil the surprise?"

Outside, the town drunk was gone, but amazingly, the sun was shining again and even beginning to pull tentacles of manure-scented fog up from the sodden street. The effect was a bit spooky. But when the townspeople saw John's badge and saw him accompanied amicably by their sheriff, they showed an entirely different face to the stranger. Everywhere he looked, people were smiling at him or waving a friendly greeting. Rekindled hope burns the brightest. As the pair walked along, only Dana Rider gazed at John in precisely the same calm, level way she had before.

"Who's the blond lady?" John asked quietly when they were out of earshot. He wasn't pleased with himself for managing to notice that she wasn't wearing a wedding ring.

"Dana? There's a woman with *jingshen*, eh?"

"*Jingshen*?"

"Pinyin Chinese word for spirit. Vivacity. And she's not even seeing anyone right now," the sheriff added slyly. "Let me tell you, Dana's something special. She owns the saloon—did all the cabinetry herself!—and has somehow managed to keep it going despite everything Dirty Jake has done to put her out of business."

John fought an urge to glance back over his shoulder. "What has he done?"

"For starters: stolen every damn bottle of sake, wine, rum, vodka, and tequila in her inventory for his private collection. She thought about arguing at first, but he just fired that weapon of his at the floor for a split-second and she changed

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her mind pronto. He allows her to keep beer and cheap whiskey around for his own men, when they get a sudden whim to ride in and drive away her paying customers. How she's kept herself out of the clutches of those sick bastards, I'll—"

"Don't look now, Sheriff," John said. "But speaking of sick bastards . . ."

With a boisterous, rapid-fire panting, a bizarre steed was galloping down the street with an equally bizarre rider. The pair left a visible wake in the ground-clinging mist and a roll of distant thunder accompanied their arrival like a fanfare.

The steed had most likely started out as *Crocuta crocuta*, a spotted hyena, but genetic alterations had turned it into something huge and repellent. It was moose-sized and its legs had been grotesquely thickened to support so much weight. Gallons of clear drool evidently used to keep the beast cool poured off its wide tongue, adding another layer of unpleasantness to the street.

The rider was worse than his steed. Almost eight feet tall and thin as a split rail, the strange slinger looked as if he'd been dead for a week but was too mean to lie down. John was pale—a result of genetically engineered anti-UV enhancements—but this man was *white*. Even his hair was white: the bright, opaque blankness of a sheet of clean paper. His face wasn't wrinkled so much as creased; deep lines were gouged into his cheeks, creases bracketed his mouth and made exclamation marks between his heavy white eyebrows. He exuded a chill you could feel from a mile away.

He wore only one pistol, custom-built with an extra-long barrel and polished bone grips. But he had a double-barreled, double-triggered shotgun on his back, held in a quick-release harness.

The ghoulish rider halted his steed with a uniquely brutal technique: smashing it near the top of its thick neck with an oversized fist. The smack was loud enough to make John wince. While the animal staggered, its owner leaped off near a red-painted hitching rail labeled "Carnivora" and tugged the beast closer to the rail by brute force. Then he tied the reins with a locking knot.

The hyena stopped panting just long enough to slurp up half the contents of the nearby water trough in seconds. Since meat spoils even on Paladin, the food bin was empty. The man twisted a red, metal flag into an upright position, thus demanding fresh fodder.

Without warning, the monster's head shot up from the water trough, swung around with incredible speed. Droplets flew everywhere. The beast lunged toward its owner, gaping mouth revealing yellow, dagger-like fangs.

The man spun around and cuffed his steed across the lower jaw with a pallid hand longer than the sheriff's forearm. The slap sounded like an explosion. The animal yelped piercingly, shook its head a few times, and grew docile.

Then the deadly-looking slinger stiffened, gradually turning like a magnetized human needle until he was facing John across the street.

Shark-like eyes with all the warmth and color of old, dirty ice stared into John's amber eyes. The two slingers stood as still as lead statues.

Slowly, slowly, the newcomer nodded his head in an almost respectful gesture and turned away. Then he glanced about and began walking unhurriedly up the sidewalk, keeping to his side of the street. People practically dove out of his way. Finally, he stepped through the doorway of Sunstone's tallest building, which was opposite the saloon. The word "Hotel" was painted over the door in chipped saffron and turquoise letters.

For a long moment, the only sound in the street was the panting of the giant hyena. Bystanders looked at each other, stunned.

"You *know* that man?" the sheriff finally asked, his voice distinctly shaky.

"Let's say I've run into him from time

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to time. They call him Hangman. I can't tell you how glad I am you *don't* recognize him. I was afraid you were about to say that he's working for Dirty Jake. Hangman would make a bad enemy."

"I believe it."

"Far as I know, he's never been an outlaw. By the way, better keep your voice way down; as soon as that monster of his catches its breath, Hangman will be able to hear you blink."

"From inside the hotel?"

"With all those open windows? Absolutely."

"Buddha! But isn't he rather . . . big to be a slinger? I understood that for real speed, you don't want nerve signals to have to travel too far, not even with the extra nerve fibers that—"

"Not all slingers are built for pure speed, Sheriff. Sometimes it's handy to have someone around who can tear down walls or uproot trees with their bare hands. My Dust Devils have two fellows like that. One of them, Joe Li, is—well, think this guy looks tough? Wait 'till you meet Joe."

"Joe Li? The one who said 'put the pieces together just right'?"

"The same."

"He isn't—is he the one called 'China Joe'?"

"Not by his friends, but that's him. Probably the only slinger on Paladin who won't wear a gun."

"Tornado Carter sure has some interesting employees. So Hangman was designed for strength?"

"Partly. He's something of a mélange. He's faster than you might think and with those long arms and legs, he's got leverage. And his skin is thick, like leather armor. He's hard to hurt; I've seen people try."

"Modifications like that don't come cheap. What's it all for?"

"Talk quieter, Sheriff. I'm serious: Hangman can out-hear a hound. His parents were both district judges down in Sparks, Dark Nevada. They expected him to be a judge too someday and thought it would be . . . handy if he could tell when someone was lying just by listening hard. And dandy to be able to perform his own executions. He didn't take to the idea of wearing a robe, but the other part suited him just fine.

"He's a charmer—has a way with animals, don't you think?" John suddenly realized that now he was the one talking too loud; he hated to see living creatures of any kind abused. He took a breath and continued far more quietly. "Once I saw him hold two large men up in the air, one per arm, and choke them both to death. Last I heard he was Dakota Bill's official executioner. I suppose he was one of the few Bullets who escaped that ambush I mentioned."

"He's a *marshal*?"

"Not technically. But he's always worked with marshals."

"Well, lawman or not, I hope to God he's just passing through."

"I'll buy a pound of that hope! Better spread the word around, Sheriff: it isn't a good idea to bother Hangman and a worse idea to touch him. Tell the shopkeepers: if he buys something from you, always put the change on the counter."

"I'll spread the word. And thanks. Now, what was it you wanted to show me?"

Chapter 4

"This is Houston," John announced with unabashed pride. "But he isn't the surprise I promised."

"Surprising enough, Marshal! Don't believe I've seen a finer-looking zebra."

"Me neither, but some folks claim his legs are too long."

Larker shrugged amiably. "'There is no excellent beauty that hath not some strangeness in the proportion.' That's according to a Mr. Francis Bacon."

John raised his eyebrows at his companion, but the sheriff was busy admiring Houston.

"I particularly like," Larker commented, "how the designer handled the stripes. I've been around fancy ungu-

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lates before—hell, my Pegasus is a damn fine antelope herself—but your fellow takes the grand prize. Plains zebra stock?"

John was fetching a saddlebag from the courtesy bin where he'd stored it. "Grévy's. Equus grevyi." Houston made a sound halfway between a high wheezing bray and a whinny.

"Who did the modeling?"

"Tornado has the best gene-jockey on the planet—the best outside of Buildem anyway. Dr. Benton Winfrey. Ben also produced what I'm about to show you. Hold on to your eyeballs!"

John opened the saddlebag, reached into an inner pocket, and withdrew two leather boxes. Inside the larger box, something was wrapped in layers of soft felt. John carefully pulled the fabric away, revealing a stiff gray creature about nine inches long.

"By God!" the sheriff barked, leaning over to stare. "What is it?

"A bird."

"*Really*?"

"More or less. Ben named him Blithe Spirit."

"Never thought birds could survive on Paladin any more than purebred horses! Or is that just a myth?"

"No myth—more like a sad history lesson. A hundred ten years ago, the first colonists brought along frozen bird embryos—mostly chicken embryos, I understand."

"Why the hell *chickens*?"

"For eggs . . . and meat. Growth-vats weren't perfected yet. They used to slaughter animals for food and leather, you know."

Larker shuddered. "Right. Read about that in school. Hard to believe."

"A hundred years from now, some of the things *we're* doing might be hard to believe. But as I was about to say, neither chickens nor songbirds thrived."

"Brittle bone syndrome?"

"No. Birds and horses have completely different problems here. Turns out that certain Paladin molds make themselves at home in avian lungs."

Larker gently touched the unmoving animal with a forefinger. "Why are birds singled out?"

John shrugged. "Maybe it's their fast respiration rate. But mold infection was always fatal. Since nobody could find a cure, for a century no one has bothered importing any member of class Aves."

"Until now."

"I was looking for a way to send messages faster than using Equus Express or the Iron Teakettle and started wondering about winged messengers. So I asked Ben Winfrey to find some way around the mold problem. As usual, he said it was impossible and went around for two days mumbling in his beard and complaining about my crazy ideas. On the third day, he sent away to Earth for genetic materials and began reorganizing his lab. You're looking at the result of six years' hard work. Of course, speaking technically, this little guy isn't entirely a bird."

"What else is it? And it feels so cold. Is it alive?"

"Let's hope so. Blithe Spirit is what the good Doctor calls a 'Homing Swift.' It has the nesting instincts and abilities of a homing pigeon, but—"

"What's a pigeon?"

Animals were *important* on Paladin; vital for transportation, farming, and biological research. Any third-grader could recite the full Latin name for a dozen types of specialized antelopes, camels, canines, murines, felines . . .

But few Paladin natives knew the difference between a parrot and a peacock. Most people were only interested in creatures they were likely to encounter. John, in contrast, had studied *dinosaurs*.

"A pigeon's a type of dove, Sheriff."

Larker nodded wisely. "Like on the world flag."

"Just so. Doves are supposed to symbolize peace, Lord knows why. Anyway, pigeons can be trained to return home from great distances."

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"Can they?" said Larker dubiously.

"Blithe Spirit has the pigeon homing instinct, yet the shape, airspeed, and control of a fast-flying bird called a 'swift.' But some of its genes are reptilian; that's what solved the fungus problem. Ben has a strange sense of humor: the reptile he used is a terrestrial prairie lizard, *Sceloporus undulatus*. Also known as a 'swift.' Kind of a . . . biological pun."

"Hilarious."

"Anyway, once we had a viable animal, we had to figure out how to *travel* with flying pets. Cages are too bulky. And little birds are delicate. So, Ben came up with this suspended animation trick."

"Ah! I see."

"So let's awaken our little helper, shall we?"

The smaller box contained a hypodermic syringe filled with pink fluid. With the utmost care, John injected the bird and placed it tenderly on the felt padding.

"While we're waiting, I'll get the note ready."

John pulled a thin strip of waxy paper from a pocket and then removed his badge. The strip was marked with hundreds of tiny squares divided into columns. While Larker watched curiously, John used the badge's pin to make holes in specific squares following a substitution cipher he'd invented.

Today was Monday, which he indicated by stabbing a specific square at one end of the paper. Now he was ready to write the text. The first letter he wanted to convey was "C." Since "Monday" has six letters, he counted six letters from "C" in the alphabet and punched the "I" square. "O" was to be next. He counted *seven* letters from "O" (the number of letters in "Tuesday") and marked the "V" square in the next column. He continued, using the standard weekdays in order and coming back around the circle to "A" when necessary.

Complete, the translated message read simply, "Come at once. Top four only."

John was proud of this easy-to-remember but hard-to-crack code. He found himself wishing he could explain it to the sheriff, who was obviously forcing himself not to ask questions.

Don't be a damn fool! John told himself.

He tied the paper around one of the bird's legs and then lifted the creature, holding it in his hands until it began to stir. He could feel its body temperature rising. Suddenly, the little gray chest began moving, slowly at first, then rapidly accelerating; the heartbeat strengthened, speeding up to over 500 times a minute. Seconds later, Blithe Spirit was standing up in his palm, looking around curiously with tiny, jerky head movements.

"Fly true," John said quietly, stroking his little ally softly on its feathered back. He lifted his arm high, giving his hand a small shake. The bird rose, circled twice over the slinger's head and shot northeast like an arrow. The sheriff and several other townspeople who'd been watching gasped. Several crossed themselves or made the sign of the Eightfold Path. The sight of an animal defying gravity seemed supernatural.

"Where's it off to?" Larker wondered.

John shook his head in disbelief. "Perhaps I didn't explain *clearly* enough. After they're trained, you can take homing pigeons hundreds of miles away—thousands even—and they always find their way home."

"Is that a fact?"

John watched his swift disappear in the gray distance and sighed as the sky darkened abruptly. "I'll need a dry place to stable Houston and a place to stable myself."

Larker was overjoyed. "Fantastic! I assumed you'd be leaving us to go fetch your team. Wait!" He banged his forehead with his palm. "Guess I'm extra slow today, but I finally get it: the *bird* is going to do the fetching. Hell of an idea!

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So you're planning on hanging around until they show?"

"That's the plan."

"Great! Then you're staying with me and the wife! No, don't argue; I won't listen. You deserve better than the Sunstone Hotel. Hell, the fleas there deserve better! Did you wonder why all those windows are kept open? It's the smell."

"I noticed a futon in your office. . . ?"

"That's for my chief deputy, Gerry Banks. He sleeps there most nights, in case someone has a bad dream or something. Frankly, I don't know how he manages to relax on that thing. That mattress is about as comfy as cold granite; put it out of your mind."

"And Houston?"

"My brother, Chin, will take good care of him for you. Unhitch him and we'll get you two squared away. I live a half-mile from here, and Chin lives right next door. And don't you worry about paying for the parking space or the fodder. The town will cover everything. All right?"

"Very much so. I appreciate your hospitality."

"Are you kidding? You're getting the short end of *this* bargain."

"When I'm settled, is there anything to drink in Sunstone, Sheriff? Besides water, I mean. I'm thirsty, but after all these weeks of rain, I don't want to pick up a glass and find water in it."

Larker chuckled. "We'll head over to the saloon whenever you want. I bet Dana will have something that isn't clear, but is wet enough."

"Good. I wanted to get a closer look at those scorch marks, anyway." Or was it, he wondered uncomfortably, that he just wanted an excuse to see the pretty, blond lady again?

Chapter 5

As John stepped through the swinging doors, he glanced quickly around the saloon. He lowered his eyes toward the zigzag burns. Someone had done some exploratory scraping, but the damage evidently went deep.

Six-guns versus plasma cannon, he thought grimly. Even I wouldn't bet a tin dime on me.

"If you like those burns," Larker said, "I can show you another set at the bakery. Our Jake gets off on scaring folks."

John didn't reply. The marks seemed to sop up his courage like charcoal sponges, so he turned his attention back to the room. He was unhappy to see that the main windows were covered on the inside as well as the outside; someone was expecting internal and external trouble.

The saloon was spacious. A u-shaped bar stood confidently in the center, enclosing a narrow, open kitchen holding an eight-burner stove with an oven and gas salamander, a wood-fired smoker, a huge white-enameled refrigerator, and a ceiling-mounted wooden rack with pots, pans, and cooking implements hanging from it jauntily. An immense polished copper hood loomed above the stove and smoker, and a round stovepipe ascended from the hood to an overhead vent. The sink was small; dishes were obviously washed elsewhere.

John noted, belatedly, a boot-scraper near the entrance and a scrap of carpet for foot wiping, but the floor had plenty of muddy footprints that weren't his. A puddle had collected beneath the stand where several coats and hats were hung. Aside from the floor, the place was spotlessly clean, its air fragrant with smells of beans, onions, hot peppers, curry, and garlic. Several large pots simmered temptingly on the stove, and the cook was just pulling out a tray of freshly baked bagels from the oven.

"Hungry, Marshal?"

"Famished, Sheriff. I hadn't realized until now."

"'Our lives are not in the lap of the gods, but in the lap of our cooks.'"

"And who said *that*?" John asked, smiling.

"Lin Yutang."

Business wasn't booming, but it wasn't dead. The sad-faced bartender was in

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place, along with a female cook who looked pureblooded Chinese. Two old men were seated next to each other at the bar on padded wooden stools, chatting loudly with the bartender. A few stools down from them, a harried looking woman with fading brown hair and a black medical bag was hunched over a cup of black coffee.

John kept his eyes moving as he and Larker dealt with their own coats and hats; he couldn't spot the saloon's owner and was irked at himself for feeling disappointed. He turned his attention to a group of four Indians huddled in quiet conversation at a corner table. Two wore white turbans and artificial feathers; the other two also had imitation feathers, but these were hanging from yarmulkes: Jewish skullcaps.

For observational purposes, their table was the most strategic spot in the room. The person seated at the most strategic chair at the table was extraordinary. He was dark-skinned and thin, his turban sported a large blue topaz, and he seemed to dominate the scene through sheer presence.

John tried to eavesdrop on the Indians while trying not to stare at the most interesting one, but the old men at the bar were too loud and the Hindu was too vivid to ignore.

Larker assessed the direction of John's gaze. "Hey! There's my friend I was telling you about, the one with the blue rock stuck in his towel. That's Shining Wing Krishna—he's somebody you'll want to meet."

Shining Wing had sharply chiseled features, a nose like a bracket, salt-and-pepper hair heavy on the pepper, and acute, sparkling black eyes. If William Caine had really been one of his school chums, he had to be in his middle sixties. He didn't look it. John felt wary of the man. If the Indian were even half as intelligent as he appeared, John would have to watch what he said around him very carefully. It wouldn't do to let the lion out of the kennel prematurely. . . .

For the moment, the Indians appeared engrossed in their discussion. With an almost physical wrench, John managed to snatch his attention away from the chief. He resumed studying the room while waiting patiently for the bartender to finish serving the old men some bowls of thick soup with warmed tortillas wrapped in a hot towel.

The Sunstone Saloon and Grill, the slinger decided, was pleasant and quite distinctive. It even had unexpected touches of elegance. A beautifully carved upright piano on a long wooden stage graced one wall and the barstools and chairs were bentwood copies of Art Nouveau designs. An ornate series of iron pipes and gears on the ceiling suggested the building had once been a mill or shop, probably with a nearby stream and waterwheel supplying direct mechanical power. Bare, less faded places appeared where pipes had been removed. The remaining ones were now used to hang oil lamps equipped with polished reflectors. Also hanging from the ceiling were some peculiar decorations.

Normally, saloons went for those traditional oversized paintings of naked ladies lying on couches in improbably seductive positions. Here, the adornments were small rectangular flags: colorful embroideries depicting various Earth-style musical instruments done on black or white cloth. Few of these instruments were available on Paladin. In John's eyes, many had an alien look. He wondered if the attractive saloon owner he was so curious about might not be a tad eccentric.

There was one other decoration. On the opposite wall to the stage, someone skillful had painted a mural-sized map of Tenderfoot Continent detailing a vast area stretching from the Rio Poco, two hundred miles from the western coast, to the Fang Peninsula, jutting three hundred miles into the Acidic Ocean in the east. The mighty Hopalong River divided the map into nearly equal halves.

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Neatly centered in the western half, the town of Sunstone, in the stateless territory of Red Clay County, was marked with a bright orange dot. A few other towns and cities were similarly branded, but Buildem alone sported a red dot. There seemed to be no pattern or purpose to these markings.

Another location was indicated in a very different fashion: someone had managed to stick an ordinary table-fork tines-deep into the very end of the Fang. Since the wall was exceedingly solid maple, the violence and strength implied by the fork was appalling. John himself was unnaturally powerful, but knew that he wasn't capable of such a feat. And why hadn't the damn thing been pried out? He stared at the somewhat twisted utensil and found it so disconcerting, it took him a minute to remember the large town that had once occupied the punctured spot on the map: Strake.

Sixteen years ago, that town had been destroyed by a horrendous tidal wave. And no one had ever dared build so close to the Acidic sea again. . . .

Flags with musical instruments, random dots on a map, a flatware testament to power and passion, and one other mystery: John couldn't identify an annoying sound that seemed to be coming from the rear wall. This was a continual rumble punctuated by a frequent, periodic squeak.

"Nice to see you, Sheriff," declared the bartender in a paradoxically warm and cheery voice, which was surprisingly high-pitched and held a trace of a British accent—a rarity on Paladin. "What can I get you two gents?" John suddenly remembered his appetite.

"Gil," said Larker, trying to sound nonchalant, "I'd like you to meet someone who's come some distance to help us. Marshal, this here is Gilbert Kleib. Gil, meet . . . Private Marshal Silver Davies."

The cook, the old men, and all four Indians fell dead silent and gazed over at John as if he were an uncertain miracle. Only the doctor kept sipping her coffee as if living legends were a dime a dozen this afternoon.

The sheriff wasn't done. "Marshal Davies works for *Tornado Carter* and the town has hired Carter's Dust Devils to deal with our . . . difficulty." Then in an undertone, he continued for John's private benefit, "That woman with the coffee and grumpy face is Dr. Barbara Gray. She's not as mean as she looks, just tired. We'll say hello later. Ling Shiliu is the cook—that's Chinese style: Shiliu is her first name. The elderly gent with the dark green vest is Jimmy Gene Fong and his bald friend is Handy Ernie. Don't be taken in by that 'handy'! Far as I know, Ernie hasn't been useful for at least thirty years."

Gil, the bartender, politely waited for the sheriff to stop whispering before he said brightly, "This is *quite* an honor, Marshal!" His expression remained as lugubrious as ever; it seemed to be his only one. But John thought he saw a faint glint of amusement in the man's eyes.

"The honor is mine, Mr. Kleib. Anything on the menu you'd care to recommend?"

"Ah. That's a tough one. Our Mrs. Ling has managed not to burn today's chili *too* badly." The cook nodded as if agreeing, then abruptly whirled around and snapped a towel alarmingly close to Gil's right ear. The bartender didn't flinch.

"Chili it is," John declared. "Smells wonderful."

"Goat cheese, chopped jalapeños, or sour cream, sir?"

"The first two, please."

"And for you, Sheriff?"

"All three, plus a side of fried tortillas and don't you skimp on the cheese like you always do. And I'll take a beer. I'd offer you a beer too, Marshal, but I understand most top slingers don't touch alcohol?"

"I've been known to make exceptions. But right now, I've got a craving

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for root beer if there is any."

The bartender certainly didn't smile, but his lips might have twitched. "Best in the territory, Marshal."

"Where's Dana?" Larker asked as Kleib began filling a large mug with a stout-like, non-alcoholic brew.

"In her office, Chou. Should I fetch?"

"Maybe later, if she doesn't come out on her own."

The food was wonderfully heartening, with undertones of Chinese, Mexican, and Cajun spices. The root beer was tangy and just bitter enough. John could feel new energy spreading warmly throughout his body and realized, not for the first time, that he needed to pay more attention to physical needs. He couldn't afford to let himself get so depleted.

With a ripping sizzle, a lightning-bolt struck close enough to make the earsplitting thunderclap virtually instantaneous. The doctor spilled the dregs of her coffee on the bar; the cook muttered "damn *shan dian*."

John blinked to clear his vision, and shook his head to clear his thinking. Five circles of blue brightness had appeared mysteriously on the stage for an instant like Buildem spotlights. He glanced up toward the top of the street-side wall. Sure enough, five of those salvaged spaceship windows had been installed inconspicuously below the soffits.

"They say every five seconds between flash and crash is a mile," spoke a precise and unfamiliar voice. "Therefore, that last boomer was sitting squarely atop my left ear. *Namiste*, Marshal. They call me Shining Wing. Care to sit with me and my friends after your meal?"

John was dismayed for several reasons. He, like many slingers, was artificially endowed with "muffs": pseudo-aratenoid muscles capable of closing off his ear-canals. These eliminated the need for external hearing protection while using firearms. But the thunder had been unexpected and in the microsecond it had taken for the muffs to clench, his eardrum must have taken a beating; he hadn't heard the Indian approaching from behind while he'd had his head turned. Only now was he becoming aware of the thick splattering of new, heavy rain.

Here was a case where strength became weakness. He wasn't in the same class as Hangman, but he trusted his ears—apparently too much.

Another cause for dismay was seeing Shining Wing at close range. John's first impression that the man was uncannily perceptive was strongly reinforced. Those black eyes seemed to absorb every tiny detail.

Talking to the chief would be risky, but how could he gracefully refuse? Besides, there was a chance he might learn something relevant about Dirty Jake. "It would be an honor to sit with you," John replied.

He barely tasted the rest of his chili.

On any other world, the combination of people at the round table in the corner might have seemed unusual—two Hindu "Indians," two Jewish "Indians." Here, it was commonplace.

When the theme planet Paladin had been set up, Earth's social physicists had installed checks and balances to keep the project controlled. If biological science attained new heights here, Earth wanted it to blossom within a context likely to minimize the risk of abuse. Social calculations led to the idea of a dual, interdependent culture: an idealized recreation of the American frontier's Old West. The "cowboy" aspect would encourage individualism and independence; the "Indian" aspect would encourage social responsibility and respect for the environment.

Finding the right kind of people to play cowboy had been easy; Earth was uncomfortably crowded. But the "Indians" were another story. By the twenty-second century, most actual Native Americans had been absorbed into mainstream society. Those few Native

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Americans who maintained the old ways refused to emigrate. After so many centuries of keeping faith and honoring the Earth, they couldn't bear to leave it.

So, the planners searched for another ethnic group with a similar cultural and philosophical valence. Finally, they resorted to a combination of two groups: Hindu yogis for their respect for life and holistic viewpoint, and Israeli Jews for their long acceptance of kibbutz living. Thus, the Hindu-Jewish tribes of Paladin were formed.

Seeing the two lawmen approach, Chief Shining Wing immediately stood. With a graceful arm-wave, he offered John his chair: the supreme tactical spot in the room. Then he moved away before the marshal could refuse and snagged two more seats from an unoccupied table, one for the sheriff. This was odd, because there was already an empty chair at his table. Some tribes, John remembered, always leave a spare seat in case the Jewish prophet Elijah shows up with an appetite.

Here, near the back wall, the background rumble and squeak was much louder.

"We all know our good friend Chou," Shining Wing announced, smiling warmly at Larker before turning to the slinger. "Marshal Davies, I'd like you to meet Straight Arrow Meyer on your right. To his right is Rabbi David Grinning Bear, and the fellow with the sweet face and the *shpilkes* to your left is none other than Hinanetaa Still Waters Shankar." Shankar had been drumming his fingernails on the table, but he stopped and frowned at his nervous hand as if he couldn't imagine how the unruly thing had attached itself to his wrist.

None of the Indians seemed to be looking at each other, but the two turbaned heads and two with skullcaps abruptly bowed Hindu-style in perfect unison. "*Shalom* and *namiste*," said David Grinning Bear, a stocky fellow with a short black beard heavily streaked with gray. "We are the four male Pillars of the Paladin Anasazi Council." His relaxed manner and good-natured voice warmed the required formality of the greeting. "Our female counterparts no longer dare move openly in this county—an offensive constraint!—so we are forced to speak for the entire tribe."

John strove to match the Indians' courtesy. "Peace. Honored to meet you all. I'm very sorry about your circumstances and hope to change things around soon."

Shining Wing held up a brown hand in an ancient Hindu blessing. "Well spoken! We just wanted to officially thank you for coming here, Marshal, and to extend our tribe's best welcome to you anytime you care to visit the New Nokai Dome area. Follow the trail northwest from Sunstone and aim for the hills. If there's anything we can do to assist you, anything at all, please let us know."

"Thank you. In fact, I can already use your help. Would you mind answering a few questions, Chief?"

"I adore questions."

John lowered his voice. "Sheriff Larker tells me you identified Dirty Jake as William Caine, the famous lawman."

"I only knew Bill as a youth, but that's right."

"Are you sure?"

"I strive to never be *sure* of anything."

Amen to that, brother! John thought. "Fair enough. How would you rate your . . . level of surety?"

Shining Wing beamed as if the marshal had said something wonderful. "Somewhere between my conviction that the sun will rise tomorrow and my suspicion that you are carrying an extra weapon holstered at the small of your back. After all, such a subtle lump could be almost anything."

John regarded the Indian thoughtfully. There was indeed a weapon hiding beneath his jacket, a very unusual gun, but the system had been designed to be in-

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conspicuous.

"Does Caine know that you know who he is?"

"Hard to say. But I managed not to greet him by name."

"Very sensible. I wonder if he recognized you?"

"Probably."

"Again according to the sheriff: you went to school with him?"

"Calling it a school is an act of mercy. Crockett Territorial High at the edge of the Sonora Refrain. My alma mater! An astonishing educational environment. Our school colors? Two shades of dull brown!"

The corners of John's lips lifted involuntarily. "I know that area, um, somewhat. The Paladin Hopi live in that part of the Refrain, don't they?"

"Your knowledge is impeccable. I was born among the Hopi."

John had seen that coming, but he found it hard to believe. This Hindu-Indian had certainly adapted to his new tribe. He didn't talk like a Hopi or dress like one. He didn't even sit like one. This wasn't simply a matter of posture. The Indians of the Refrain (Paladin Hopi, Zuni, and Dineh) never faced each other while conversing; watching a person while they were speaking was considered a sign of mistrust. Shining Wing's eyes twinkled as if he were enjoying John's private thoughts. It was hard not to like this remarkable man.

"If you don't mind a personal question, Chief: did you choose to leave the Hopi or was it a matter of tribal law?"

"Both. I loved my natal tribe dearly, but since I had an older male sibling, Law required that I find another tribe. But, as I expect you know, Hopi aren't slaves to law; if my heart had insisted I stay, something could have been arranged."

Straight Arrow Meyer, who was small and a bit pudgy, sniffed disapprovingly. "Which would've been *wrong*! The chief and I argue about such things at least once a day, Marshal. In my opinion, certain tribes can be dangerously irresponsible. The law exists to insure genetic diversity."

Grinning Bear and Hinanetaa Shankar both rolled their eyes. Apparently, the subject had worn out its welcome with them. But Shining Wing's response was to pat Meyer's hand with great affection.

John had once worked closely with some Hopi and had learned to appreciate their tribal philosophy of moderation and balance. "I know there's a solid reason for your law, but I'm not sure any law should be applied blindly."

Straight Arrow leaned forward eagerly, but the chief beat him to the punch. "I agree. But is tribal law any worse than your slinger code? What could be harsher than the way you are required to consent to any dueling challenge from another slinger, even if you know you will lose?"

The comparison wasn't completely fair. A crucial part of the long and difficult training that brought slingers to their full potential was conditioning the trainees to avoid unnecessary duels. But the chief was still talking. . . .

"In my case, Marshal, I was lucky. While I hated to leave my family and friends, there were compensations. What an adventure to begin an entirely new life just as you enter adulthood!"

John wanted to learn more about Shining Wing and his tribe-mates, but there were concerns of far greater relevance.

"Let's get back to William Caine. What was he like when you knew him?"

"Old for his years. Steadfast. Serious. Somewhat joyless. And he was the quickest, strongest person I have ever met. I understand his parents spent a fortune on his enhancements and he was something of . . . an experiment."

One of the doors at the rear of the saloon opened and Dana Rider emerged. She immediately caught the sheriff's eye.

"Excuse me, friends," Larker said, standing up. "Looks like Dana wants a

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word."

"Feel free, Chou-chou," David Grinning Bear offered with a flicking motion of his fingers. And kindly bring me some dessert when you return."

Larker regarded the bearded man sadly and leaned over the table. "We're going to have to cut you off, Rabbi, at one dessert today. These chairs can only take so much abuse."

The sheriff joined Dana and the two walked slowly together toward the bar. John would have dearly loved to catch that conversation, but he didn't dare remove his attention from the formidable man across from him.

"Sheriff Larker," he said, "says that Dirty Jake has collected quite a crew."

Shining Wing nodded. "Chou is a wise fellow. As he probably mentioned, Caine has dubbed his outlaws 'Mudslingers.' "

"He did. Do you have a clear idea of how big this gang is?" John wanted a second opinion.

"As of last count, Caine has collected six top slingers and thirty-five partially enhanced outlaws."

"Last count?"

"The Mudslingers keep gathering more mud, and they seem to be gathering it faster lately."

Damn! John thought. No wonder Larker had been so cagey with his answer; he didn't want to scare me off.

"Are you saying Jake doesn't have *any* naturals on his payroll?"

"He has a support staff. Cooks and veterinarians. Maintenance people. Most of those are just plain folks like me."

John had seldom met anyone less plain than Shining Wing. "How are you managing to get such detailed information?"

Shining Wing exchanged glances with his comrades. John suddenly remembered the rumors about tribes that had adapted certain Yogic practices for purposes that were, perhaps, not entirely spiritual. These tribes were reputed to have secretly developed ninja-like spies known as Indian Scouts, who could somehow make themselves invisible, or at least unnoticeable.

Hinanetaa Shankar tapped on the table with a fingernail, not out of nervousness this time, but to attract John's attention. A tiny spark in his otherwise mild eyes implied that he understood the thrust of John's thoughts. In a quiet, silken voice he said, "There might be four Indians at this table. Then again, there might be five."

John squinted involuntarily at the empty chair and felt goose bumps rising. The idea that someone could be seated right there with John unable to see . . .

All four tribesmen burst out laughing and John's smiled sheepishly. "All right, you've got your methods, whatever they are. I suppose what I'd like to know more than anything, Chief, is how a man like Bill Caine could become corrupt. It seems inconceivable."

"So. You knew him yourself, then?"

This was a risky topic, and John answered candidly but incompletely. "Yes. At the time, I thought he was the finest law officer I'd ever met."

"From the young man I knew and the man you describe, I don't think he *could* become corrupt, Marshal. I suspect he had his reasons for becoming Dirty Jake. That doesn't mean that any of us would agree with those reasons."

"I should think not. Thank you, Chief. It was a real pleasure meeting you and your tribemates. I'd like to keep asking questions, but for now, I'm out of ammunition. Perhaps I'll get a chance to go visit you."

"Anytime, Marshal. And remember, if you ever need help, I'm easy to find and I visit Sunstone often."

John bowed Hindu-style to the four Indians as he arose and they grinned and responded by waving goodbye, cowboy-style. John was somewhat alarmed to find himself chuckling as he walked off. Where was his vital detachment?

He was halfway back to his original table where Larker and Dana were now

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seated when two more lightning bolts lashed the sky, one after the other. The flashes were unusually intense. While thunder was still rolling heavily, something nudged the saloon doors. It wasn't a stray gust. When the sky lit up for a third time two heartbeats later, a tall spectral figure, outlined in blue electric fury, was standing between the saloon doors, holding them wide open.

Cold fear swarmed up the marshal's back; the specter had white blankness where a face should have been . . .

Then common sense kicked in and John realized that Hangman was standing in the doorway—no one else in town was likely to be so tall—and for some reason he was standing backwards in the doorway, facing the street. A new, more rational wave of alarm coursed through John's body. Was something happening outside he should know about?

If so, it evidently wasn't urgent. Hangman let both doors swing closed and spun around to face his fellow slinger.

The bartender had been in the process of sliding a beer along the counter to Handy Ernie but surprise and fright spoiled his aim. Without hurrying and without taking his eyes off Hangman, John strolled over and caught the drink before it wound up on the floor.

With a tiny head motion and a flicker of pale eyes, the tall slinger said, "We need to talk" without uttering a word. John reluctantly agreed by nodding. Then Hangman seemed to lose interest in the silent discussion. He took one look around the room, and stalked over to the table occupied by the Anasazi.

He said nothing and seemingly paid no more attention to the four men then he would have paid to four raindrops. Nevertheless, Shining Wing got the message. He and his companions stood and made a dignified exodus to the doorway. As the chief passed through, he gave John a wink and stopped for a moment to whisper something into Larker's ear. The Indians stepped out into the storm and half the warmth in the saloon seemed to go with them.

Doctor Barbara Gray glared at Hangman and then glared at the marshal as if one slinger was bad, but two rendered a room unbearable. She grabbed her bag and hurried out into the rain after the Indians.

John was more than a little intimidated by Shining Wing, but he'd already developed tremendous respect for the man. Seeing him dismissed in such a cavalier fashion made John angry. In the ledger of his heart, he drew another red mark against the professional executioner.

Chapter 6

"What's up?" Larker whispered when the marshal got close enough. The sheriff's eyes were fixed on Hangman, but Dana was studying John's face.

John did his best to look friendly and unworried. "I'm not sure yet. Would you mind terribly introducing me to your friend, or should I do it myself?"

"Oh. Once upon a time, I had manners. Dana, this is Marshal Silver Davies." John could practically feel Hangman's ears perking up behind him. "Marshal, I'd like you to meet Dana Langhorn Rider."

"What a pleasure, Marshal! Chou was just telling me about you." Her voice was clear but warm and neither too high or too sweet.

"The pleasure's all mine," John responded, feeling more clumsy than gallant.

"Chou claims you're Tornado Carter's right hand man?"

"I wouldn't put it that way myself. Besides, he's ambidextrous."

"But you do work with him?"

"Yes."

"I've heard stories about Carter, but I don't know anyone who's actually met him. What's he like?"

John shrugged uncomfortably. "People are always asking me that and I never know what to say. You'll have to judge for yourself."

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A soft but low-pitched growl resonated from the back of the room and it took John a moment to realize that Hangman had cleared his throat.

"Will you two excuse me for just a minute?" said John. "I've been paged. But I'll be right back—I hope."

As he approached Hangman, the death-pale giant pulled a chair out as an invitation. This chair was the one next to him, strategically superior to the one across the table. John was startled by the courtesy.

But he doubted he was going to enjoy this conversation.

Larker watched the two slingers talking and wished he had Hangman's ears. Whatever they were discussing, Davies wasn't looking thrilled.

Although Chou hadn't been born with a slinger's artificial advantages, he'd been naturally blessed with a crackerjack intuitive sense. It had saved his life more than once. He'd been the only person in the saloon unsurprised by Hangman's dramatic entrance. In fact, he'd been half-expecting it. So Larker had spent that initial moment observing everyone else's reaction to the intruder.

Dana's eyes had become wide and alarmed, then her resolve kicked in and she'd abruptly looked as calm as Lake Cody on a windless day. The two elderly friends at the bar had kept very still. The cook had glowered at the newcomer and muttered something in old Pinyin. At the bar, Gil had turned almost as white as Hangman himself. That was unusual; Kleib was normally unflappable.

But the most interesting reaction had come from Silver Davies. When Gil's hand had slipped while sliding a beer on the counter, the marshal had caught the mug before it could fall. This would have seemed like lucky timing if Larker hadn't known better. Davies had been walking straight across the room and the bar was several steps out of the way. Yet, the lawman hadn't rushed one little bit. His course must have deviated the instant Gil had pushed the beer. . . .

Chou found the reaction speed and precision of judgment necessary for such a subtle maneuver intimidating. Probably only he, Davies, and Hangman knew the gesture had been more than a small act of kindness. It had been, in its way, a threat.

As John returned, he tried to put on his usual poker face, but it kept slipping off. He couldn't imagine what expression he *was* wearing; it had been a strange conversation. Larker was watching him intently and John could practically hear the sheriff reminding himself not to blurt out questions when Hangman was around.

The problem solved itself a moment later when Hangman went into a bathroom at the back of the room and closed the door. While the door had been open, the rumble and squeaking had increased tenfold.

Dana pointed toward Hangman's empty chair. "Chou warned me about that slinger's hearing. But if we don't shout, I'd think we should be able to talk freely until he comes out."

John exhaled as if releasing too much internal pressure. "Maybe, but don't count on it. Don't say anything you absolutely don't want Hangman to know. What's causing all that ruckus?"

"The bathroom fan."

"A fan?"

"This place used to be a metal shop powered by a waterwheel on Cai Hong Creek right behind here. The wheel is still in good shape. I reconnected the main drive pipe and I'm using it to run three fans and a homemade dishwashing machine out back." Her eyes sparkled. "Been meaning to oil that old thing for weeks. Funny how often procrastination pays off!" Dana shook her head self-disparagingly. "Here I am, gabbing away about nothing and using up our time."

The sheriff had been dying for his chance. "What did that monster want, Marshal? What's he *doing* in Sunstone?"

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"I don't know why he's here—he said he wasn't ready to talk about it yet—but he asked for my . . . endorsement. He wants to join the Dust Devils."

"What in the world did you tell him?"

"I didn't want to flat out say no, although the proposal certainly, um, lacks appeal. I explained that my outfit has no need for an executioner since we don't do our own executions."

"How did he take it?"

John gazed wonderingly toward the bathroom door. "He told me he doesn't want a job as an executioner. He says he's getting sick and tired of killing people."

"Good for him," Dana commented wryly. "And maybe for us."

"I agree, but it puts me in an awkward position." Which was putting it mildly. "I told him I'd think about it."

Larker looked pensive. "Is that the *only* reason he wanted to talk to you, Marshal?"

"No. He claims there's a man in a third-story room in that hotel across the street. He says this man is sitting in the dark near a window, pointing a rifle at the saloon doors and muttering how he's finally going to get even with the—I quote—'fucking slingers.' "

The sheriff's face reddened, but John knew the reaction had nothing to do with insulting language.

"Hangman can tell all that just by listening?" Larker asked.

"I imagine," John stated dryly, "it wasn't his *ears* that told him the room was dark. But for the rest of it, yes. Hangman can read echoes. He also said that the entire third floor over there smells like the foulest booze in the galaxy."

Larker sighed. "I was afraid of that. Only Coby Patterson could stomach that rotgut of his. But don't you worry about Coby. Whenever a slinger is in town he *always* goes to his room and waits by the window with a rifle, but it's never loaded and he never pulls the trigger. Besides, we've made sure his ammo is bad."

"Does this Coby happen to be missing an arm?"

"Hey! How'd you know?"

"Passed him on the street earlier. He threw a bottle at me."

The sheriff looked stunned. "No shit? He's never dared a stunt like that before!"

"People change. Could be a good thing his ammo is bad. What does he have against slingers?"

Larker took a quick gulp of water and wiped his mouth with a sleeve. "Ten years ago, he was a stable-hand and a good one. Then a leopard-based mount bit his arm off. The slinger that owned the animal watched the whole thing happen and had a good laugh."

"Charming. Gives us all a good name. Why doesn't Patterson have his arm grown back?"

"Ah. That's the rough part. He can't."

"Why not?"

"He's allergic to the Tailor."

"Lord! That's a new one on me." John's eyes stayed focused on the larger man, but his mind was elsewhere, hunting implications.

GM coli, the "Little Tailor," was Paladin's way of effecting genetic surgery without electronic aids. This deliberately mutagenic bacterium, derived from nasty old *E. coli*, had become the major tool for rearranging human and animal DNA. Gene designers would work out the details for whatever change was desired. Then they'd apply specific organic chemicals to mold the Little Tailor appropriately. The bacteria would finally be injected into the subject, usually a fetus.

To prevent accidents or abuse, the Tailor would, as a last act, encourage the host organism to develop antibodies against itself. In emergencies such as a lost limb or eye, immunity could be temporarily repressed with anti-antibodies. . . .

John was still puzzled. "Why can't an allergy like that be fixed? No, hold on. I see the problem: you can't fix it without

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using the Tailor—not on Paladin anyway. And if you suppress the entire immune system to block the allergy . . ."

"The regeneration trick won't work. It's a double catch! And a damn shame. Coby was a good kid. Not brilliant, but hard working and reliable. He had a gift for dealing with both animals and machinery. When that slinger just sat there and laughed at his pain—well, something must've snapped in his head. And when he realized his injury was permanent, whatever snapped just plain broke off. I've been trying to get him straightened out for years, but—" self-anger tightened the sheriff's voice "—all I've managed to do is to make him feel worse about himself. Which makes him drink even harder. I never have enough time for him, and I've had none at all lately. Suffering Guanyin! You don't want to hear this shit on top of everything else."

"Not at all. I've got a weak spot for lost souls. Have you tried—"

The saloon doors banged open. A heavyset man dressed in a yellow rain-slicker pinned with a deputy's badge came stumbling into the room.

"Sheriff?" he yelled, brushing rain from his eyes. "We got a situation. The Coombs brothers are at it again. They're going to kill each other this time for sure."

Larker groaned, "And what an afternoon for it!" He started talking fast. "Gerry, this is Marshal John Davies. He's one of the Dust Devils I sent for. And Marshal, here's my chief deputy, Gerry Banks. Marshal, I've got to go."

"Want some help?"

"No. When you're done here, head up to the house. You know where it is. The wife should be home and if I'm not there yet, introduce yourself and tell her I'll be along. Her name is Karen. Take care, Dana. Hey Gil, next time I'm putting in the damn cheese myself! Come on, Gerry—let's get wet."

Alone with a woman he found himself unwillingly drawn to, John's tongue suddenly seemed too thick. He wasn't quite sure what to do with his hands except stare at them. That way they wouldn't take a cue from Still Waters Shankar and begin drumming on the table.

"I was wondering, Marshal, why you came to Sunstone alone."

Her sympathetic tone drew his eyes back to her face. "My friends call me Johnny." He hadn't meant to say that! The words had escaped like animals leaping from a cage. Hadn't he learned by now that he couldn't afford attachments?

"Johnny it is. And in that case," she continued matter-of-factly, "I'm Dana. But you haven't answered my question."

He did his best to explain his "booking agent" duties without piling too many new lies atop the old ones. As they talked and his self-consciousness eased, he found himself increasingly admiring the woman. She was brim-filled with positive attitudes and unusual resources. In addition to her business skills, Dana was a musician, embroidery artist, carpenter, cabinet-maker, and something of an inventor. She'd designed her dishwashing machine herself and built it from an old water-tank and some spare pipes and fittings from her ceiling.

The more he studied her, the more he liked her face. It showed hints that she'd been through hard times, but it also conveyed a rare sense of delight. Here was a person who could savor the moment, a person with an obvious, simple gift for having fun. He found such innate joy indistinguishable from beauty.

For her part, Dana found John's face equally fascinating. Something profound was hiding behind those golden eyes; something committed yet compassionate. Also a deep sadness. To her, his expression seemed a deliberately opaque veneer over intense passion. She sensed there were important things he wasn't telling her, but her heart said that he

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was a man worthy of trust.

——Unfortunately, she'd learned to doubt her heart. Once, she'd considered herself a good judge of people. But then she'd made a mistake big enough to last a lifetime. . . .

John needed to know something, but was reluctant to spoil the developing mood. Instead, he asked about the flags hanging from the ceiling.

"Do you like them? I embroidered them myself."

"Well, they're attractive and certainly very well done, but . . ."

"I know," she laughed. "Odd in this context, right?"

"I won't argue. What's the name of the instrument on that one? Between the *erhu* and *bianzhong?*" He was pointing at a flag hanging over Handy Ernie's head.

"A bassoon."

"Bassoon? What an odd name!" He was disquieted to remember feeling a touch superior to the sheriff when the subject of birds had come up. Obviously, John had his own educational limitations.

"I have an old dream, Johnny. When I was little, my father gave me piano lessons. I fell in love with music. Then, when I was eighteen, he took me to Earth. He wanted me to see how much more there was to music and to life than Paladin."

John managed to swallow a rising tide of envy. "I wish I could visit Earth," he admitted frankly.

Dana grimaced at her own insensitivity. "What was I thinking? I'm so sorry. I forgot that part of the code."

"That's alright. But you have a common misconception, Dana: the ban on space travel *isn't* part of the slinger code. It's something forced on us by the Space and Colonization Administration. The SCA is afraid of people like me—particularly afraid to let us visit the home world."

"That isn't fair!"

"True. But you can see their point: slingers are dangerous. You were telling me about your dream?"

She nodded. "Have you ever heard the Buildem Symphony perform?"

"Maybe a hundred times. With Slinger School so close to Buildem, it was easy to catch concerts during my training."

"How lucky! And it means you've got the background to understand. I didn't like Earth. It's unbelievably crowded and there are insects you never imagined. Flies *everywhere*. Everyone looks half dead and completely bored and—"

The presence of exotic insects such as flies sounded to John like enough justification alone to make the long trip. Of course, he was even more interested in terrestrial animals; but then, not everyone shared his tastes.

"—the cities are terrifying. They're so huge and busy. And everything you see is grimy."

"What about those 'scientific marvels' the home world is supposed to have?"

"I'll give them that. Earth technology *is* impressive—they use gravity in strange ways—but that part was just like visiting Buildem, only more so. What really hits you about the home world is all the little things. Things you might never think of, like how the zodiac is based on constellations you only see in Earth's sky. But I learned something more important to me than where so many symbols came from. I learned what an orchestra is supposed to sound like."

"Better than our symphony?"

"You wouldn't believe the difference. Besides, we don't have half the instruments we should. For the first time in my life, I heard genuine pianists play. I'd thought I was getting pretty good, but when I got home, I started *practicing*."

"I'd love to hear you perform sometime." What do you think you're doing? he asked himself.

"Try and stop me! But I'll never reach the level of Earth artists. The best ones haven't done much in their lives *except* practice. Rather like you top slingers,

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only with music instead of weapons."

"And your dream is to bring, um, better music to Paladin?"

"Why not?" Her eyes were radiant, yet a paradoxical small tear glistened in each corner. "Is there anything in the Charter against it?"

"Not that I know of," he replied tentatively, feeling somewhat out of his depth. "Why do I get the feeling that you're doing more than just dreaming?"

"Because I am. I'm giving piano lessons whenever I can squeeze out some time, so that more kids will grow up with music. And it's taken me years, but I've convinced the Aurado Pipeworks to start making trumpets and cornets. Trumpets on Paladin! I've got a prototype cornet in the back room and it's absolutely . . . *terrible*! Leaky valves and the worst sound you ever heard!"

"That bad?" John chuckled.

"Horrifying! Turns out there's an art to bending small pipes. I've experimented with the thing and it makes these squeals—they would scare you out of your skin! I finally had to quit practicing because it was frightening the local steeds." Her laugh sounded like good music to him. "But the pipeworks is finally getting it right."

"I hope so."

"I'm also this close to getting other instruments built. Pianos are available, of course. And violins, cellos, and guitars are no problem; Sunstone has its own luthier. But reed instruments need reeds, which come from a bamboo that doesn't grow here or are made of plastic we don't make here. Not yet, anyway. Still, reeds are small and light; they could be imported cheaply enough. The main difficulty—I'm sorry. This is my pet project and I could go on about it forever."

"I don't mind. I like it when people have something they believe in. But why is this so important to you?"

Both pride and sorrow enriched the summer turquoise of Dana's eyes. "I told you it was an old dream. Originally, it belonged to my father. He died the year after we got home from Earth."

"What a shame. If you don't mind my asking, how did he die?"

"A stupid, stupid accident. He was on top of a big rock at our family ranch, the Nokai Corral, and he slipped."

Her love for her father rang clearly beneath the surface of her words. But mention of accidental death reminded John painfully of what had happened to his little brother, Stevie. It also reminded him of the Strake disaster and the topic he'd been avoiding.

"Rotten luck. But you've found a wonderful way to honor him."

"Thank you for understanding."

"I noticed the map on your wall."

"I was wondering when you were going to get around to that. You want to know about the fork?"

"I don't *want* to, but I expect I need to. But let's procrastinate a bit longer—I hear it pays off. What do those colored dots signify?"

Dana's eyes twinkled impishly. "You haven't figured that out by now? I marked every town that has a concert hall or a place like my saloon, where music is performed."

"So few?"

"That will change."

"I believe you. All right—tell me about the fork."

Joy drained from Dana's face. "Dirty Jake did that."

John sighed. "Why haven't you pried it out?"

"He told me not to. He hasn't been in my saloon since he did this, but at least once a week some of his slingers show up."

"I see. Any idea why he did it? Does he have something special against Strake?"

"I didn't ask. You should have seen his face, Johnny! When he saw my map, he didn't say anything at all, but his eyes were like . . . volcanoes. In my business, you meet all kinds. You never know who's going to walk in your door. I've met plenty of slingers; some decent,

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some horrible. But Dirty Jake is the only person I've ever met that made me wonder . . ."

"Wonder what?"

"Is this a human-being or something . . . else? I'm not touching that fork while he's still in Red Clay County."

Chapter 7

The rain eased and finally stopped just in time for the setting sun to splash lurid tints across the heavens. All five high windows in the saloon revealed a different color, as if each was showing a sky from a different planet.

Hangman finished his meal, slapped money on the table, and strolled to the exit without another word. He opened the doors a crack to study the exterior scene before he departed.

With Hangman gone, John lost his private excuse to keep talking with Dana. After apologizing for ending the conversation abruptly, he reluctantly dragged himself from the table. To his pleased surprise, Dana accompanied him outside and they stood awhile in companionable silence, admiring the sunset together. The colors were as clean and vivid as new love, but John was careful to keep an eye on the third floor of the hotel.

The air had turned chilly and Dana wasn't dressed for it. "I'd better get back to work," she said, shivering a little, "but I . . . enjoyed talking with you."

"Likewise. May I offer you my coat?"

"No, thanks. I really need to get some things done. But let's get together again soon. Sometime tomorrow?"

"I'd like that very much."

John headed off to the sheriff's house in a mood both excited and deeply troubled.

Karen Mueller, Sheriff Larker's wife, was surprised to see John, but accepted his explanation with impressive grace. Karen was a college-level schoolteacher who traveled several hours each school day on the steam-powered Iron Teakettle (Western Tenderfoot's only railroad) to reach her classroom. She was small and pleasantly plump. Her light brown eyes had an exotic cast, suggesting those of a contented cat. She wore a constant slightly bemused smile, as if life had surpassed her expectations. But her forehead showed lines carved by long and unremitting stress.

Dana Rider, he thought, glows with humor, but Karen seems more at peace with herself, despite the strain she's obviously under. Of the two, Karen is the one with the happy gene. Maybe I could borrow it sometime.

The Mueller-Larker house, which he'd seen earlier when he'd dropped off his traveling gear, had seemed inviting before, with its overstuffed furniture and brightly-painted swing-set outside. But with "the wife" at home, bustling about, it seemed like a haven—the sort of place even a marshal might take a nap on the couch.

John had followed Karen into the kitchen—she seemed completely at ease with him—when he noticed a small, wall-mounted bookshelf. It held only four volumes, and he could read the titles from where he stood. One book was *Sixty-eight Thousand Quotes For All Occasions*; he smiled and asked if he might take it down.

"Please do. It's my husband's favorite," she said seriously. "Whenever he has a big problem, he closes his eyes, opens to a random page, and puts a finger down on the paper before he opens his eyes."

"And that helps?"

She laughed quietly. "*He* thinks so. He says that whatever quote he lands on, it's always the perfect one."

John opened Larker's source of inspiration and realized, from the superior paper-quality, that it must have been printed off-planet. This was unusual because paper books were normally considered too bulky to be worth transporting on starships. Pages were typically stored on stabilized microfilm (which

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was less susceptible to radiation damage than magnetic or optically encoded media) and then eventually reprinted on the destination planet. On Paladin, all such transcriptions were done in Buildem, because microfilm-reading machines required electricity.

Magazines, on the other hand, were often printed on thin plastic—so thin, the entire magazine could be rolled into tiny tubes. Such magazines were "filmies," but everyone called them "flimsies."

John was about to ask Karen about the book's history when a quotation distracted him:

The brain is a wonderful organ. It starts working when you get up in the morning and doesn't stop until you get to the office. Someone with the improbable name "Robert Frost" had penned this gem.

"Maybe they aren't *always* perfect," he muttered under his breath. Or just maybe, he speculated, the Universe is warning me to get *my* brain fired up. . . .

He flipped a few pages and a brief assertion jumped out at him.

The unexamined life is not worth living. Socrates said that and here John felt on solid ground. He'd even heard of Socrates.

"Find a good one?" Karen asked, pulling home-canned goods from a pantry.

"I'm not sure. Apparently Mr. Socrates once said, 'The unexamined life is not worth living.' Sounds pretty, but I'm not sure I completely agree. Seems to me that—that it's really the *unappreciated* life that isn't worth living."

"Oh, my! Do me a favor: repeat what you just said for my husband; he'll want to write it down."

John felt embarrassed. "I'll try to remember. Aha! Here's one that makes sense to me. 'Worry doesn't empty tomorrow of its sorrow, it empties today of its strength.' Credit goes to someone named Corrie Ten Boom. Ten Boom. Sounds like the dynamite went off nine counts early. Know anything about her? Or is Corrie a man's name somewhere?"

"When I get to school tomorrow, I'll try to find out if you like."

"It's not all that important." He was trying to keep his voice light, but he'd just stumbled on a saying that had electrified him:

We make a living by what we get, we make a life by what we give. Winston Churchill. This simple statement summed up John's philosophy; he suddenly wanted these words, no others, to be his epitaph. And he wondered who Winston Churchill had been; if he'd been, perhaps, a terrestrial lawman. But he didn't want to ask; the little aphorism was simply too . . . personal to talk about right away. He returned the book to its shelf tenderly, as if he were handling delicate glass.

John declined Karen's offer of dinner with thanks—he was still full from lunch—but he helped in the kitchen by cutting carrots and protein-enhanced potatoes for an evening stew. The sheriff still hadn't gotten home yet, but Karen's two young boys, Bai and Brice, returned from playing with a neighbor and from then on were constantly underfoot. They were fascinated by John's double-handed dexterity with knives and kept urging him to peel faster and faster although his hands were already a blur. They clapped when the knife began to whistle as it moved through the air.

"They're not going to try to copy me, are they?" John asked Karen sotto voce.

"Heavens no!" she responded just as quietly. "My boys regard cutting veggies as *work*."

The entire scene was warmly homey and made John yearn for a family of his own. If only he could afford such things. These days, no marshal with a thimbleful of compassion could afford . . . dependents.

Chou Larker finally appeared about the time the stew was ready and rolled his eyes when his wife asked him how

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the day had gone.

"Coombs brothers again?" Karen said sympathetically.

"Who else? If they don't kill each other soon, I may save them the bother. But for some reason," he sent the marshal a conspiratorial look, "I feel better tonight than I have in months."

John sat with the family through dinner, nibbled on Karen's homemade bread, and took the opportunity to ask a few questions about Sunstone, its locale, and Chief Shining Wing's people.

"I've never heard of the Anasazi Indians," he admitted. "Where do they live on Earth?"

"You're the history expert, sweetheart," Larker mumbled through a full mouth.

Karen's dimples deepened. "I'm afraid there aren't any left, Marshal. Once they dwelled in the Four Corners Plateau area of the United States: the intersection of Colorado, Utah, Arizona, and New Mexico. Mostly Utah. But that was over two thousand standard years ago. They didn't call themselves Anasazi. That's only what the old Dineh, the so-called Navajo, named them. It means 'Ancient Enemies' or 'Ancient Ancestors' or even 'Ancient Ones' depending on which sources you believe. The Anasazi were great basket-makers and potters and pueblo-builders."

"Why did Shining Wing's people choose that particular identity for themselves?"

"Because the locale where *our* Indians live—about twenty miles northwest of here—is like a scaled-down version of a great, carefully preserved wilderness in Utah: Nokai Dome. The original Anasazi inhabited the Dome for centuries. One of the first settlers here, Gregory Rider, was born in Utah. He noticed the resemblance and dubbed the area 'New Nokai Dome.'"

"Gregory," Larker interjected, "was Dana's great-grandfather."

"What happened to the original Earth Anasazi?"

"They vanished suddenly. Or they may have vanished. No one knows for sure. One of those mysteries. Some scholars think they wandered south to become the Aztecs; other experts believe that the Pueblo Indians of New Mexico and Arizona, like the true Hopi and Zuni, are their descendants."

After dinner, John wandered south himself, but only next door to Chin Larker's stable to look in on Houston. Chin, the sheriff's youngest brother, was indeed taking excellent care of the zebra, but John took out his currycomb and brush anyway and worked briskly until the animal's coat positively shimmered in the gaslight.

Ben Winfrey, who'd come up with the recipe for Houston, had a saying about herd animals: You can take the zebra out of the herd, but you can't take the herd out of the zebra. He meant that such steeds need companionship to be happy and healthy. John didn't mind. He was often hungry for companionship himself and usually used such opportunities to talk out his troubles.

"I like this town," he acknowledged quietly. "I like the people. They don't deserve Dirty Jake, but what am I supposed to do about it? He's got the numbers, and he's got a serious weapon. And if he's really Bill Caine—and it's hard to disbelieve that Shining Wing character—I'm in over my head. Any ideas?"

The zebra's only idea seemed to involve an evening snack.

"There's more. I met this great woman—her name is Dana. You'll like her, but she makes me feel things I have no business feeling. But if I close my eyes, it's like her face is pasted on the inside of my eyelids. And what do you think will happen when she finds out just how honest I've been with her? She may never forgive me. Houston, old friend, I'm afraid we've got problems. . . ."

John patted his steed one final time before returning to the sheriff's house. He knew he wasn't going to like the an-

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swers, but he needed to ask some hard questions about energy weapons. He walked slowly, dragged down by an increasing weight in his heart, an inchoate sense of something terrible on the horizon.

No one appreciates a good bed more than someone who often sleeps on the ground. To John, the guestroom bed in Larker's house felt like a cloud covered in silk. He was clean for the first time in days; the hot shower had been liquid bliss. He even forgave water for being rain so much of the time lately.

But lying on this barely solidified cloud, he could only toss and turn. He was too tired to sleep—so tired it hurt. His mind wouldn't stop racing. Sunstone was filled with interesting little items that raised interesting strategic possibilities. He needed to figure out how to use these things intelligently, but was too exhausted to be clever.

Finally he drifted off, but felt as if he were still awake. Dreams came and went. Hangman played a disturbing part in several, and John caught ominous glimpses of some shadowy, vague form holding a fork as if it were some kind of alien gun. As usual, he had the bad dream about his dead brother. Then Dana showed up and the dreams improved. . . .

He was vaguely aware of some fuss in the distance, a pounding at the door, shouts, but it didn't seem to have anything to do with him.

Then he was in the middle of the single most erotic dream of his life, until someone started shaking his arm. He was so disoriented that at first he thought the shaking was part of the dream. He was shocked and embarrassed to open his eyes and find Sheriff Larker standing next to the bed rather than the blond woman who'd been playing a starring role in his phantasm.

"What is it?" John muttered groggily. The next instant he was wide-awake. Slinger night-vision allowed him to see Larker's injuries in shocking detail. John tried not to look as horrified as he felt.

The left side of the sheriff's face was bloody and extravagantly swollen, giving the eyebrow a sardonic lift. The left eye was beet-red, its lid severely engorged. His nose was obviously broken. But Larker's right eye was focused on John, as if the bleeding, pain, and possible concussion were irrelevant.

"Get up." The lawman's voice was slurred. "Dana's in trouble."

"What kind of trouble?" John asked as he threw back the blankets and began rapidly pulling on clothes. He was abruptly unconcerned about trivialities such as erections and didn't bother with underwear, socks, or his hat.

Larker's breathing was noisy. "A couple of Jake's punks showed up at the saloon. They don't understand the word 'no.' Tried my best, but the assholes have got goddamn speed enhancements."

"What happened?" John demanded while strapping his .25-caliber flat-cannon to the small of his back, hooking the firing cable to his belt-buckle, and hiding it by donning his jacket.

The sheriff took no notice of the unusual firearm. "They took my guns away like I was a damn *toddler*. One slapped me in the face."

"Go to the doctor. I'll deal with the punks."

"No. I'm coming too."

"You can't keep up." John tightened his gun belt. "Go see the doctor!"

"Later. I'm heading back. Even if I have to crawl."

John's heart twisted in empathy and admiration, but he merely said, "At least smear some healall on yourself, damn it." Healall, a jellied form of genetically altered aloe, could help the human body recover from anything from burns to bullet wounds.

John took the twelve stairs to the living room in one jump and was out the front door before Larker could leave the bedroom. The sheriff wasn't sure if

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Davies had really been moving as fast as it had looked, or if his head injury was producing hallucinations.

Karen and the kids were still asleep; Larker was always amazed at the way his family could sleep through just about anything. He envied them.

Although it was drizzling steadily outside, the night sky had a silvery glow; the larger of Paladin's two moons, Dalton, was up and nearly full.

John didn't even consider fetching Houston—he was faster than his zebra for short distances. Houston had been enhanced primarily for endurance, not speed. But the muddy road was a bad track.

As he ran, urgency pouring extra strength into his legs, John worked to clear his head of fear for Dana and anger over what had been done to the sheriff. Despite his intentions, John was already thinking of Larker as a friend. But anger generates tension, and tension makes a slinger slow on the draw.

There were clues that Sunstone was under periodic siege. It was nearly midnight according to the big clock over the sheriff's office, but the Main Street gaslights, mounted on tall poles, were still burning. A sentry was on duty, some deputy John hadn't met: a big man with narrow shoulders standing beneath the Sunstone Bakery awning. A large warning bell was resting between his feet. The deputy blinked in astonishment at John's running speed, while waving the slinger ahead frantically.

The rain had eased to drizzle. Dense but narrow pleats of fog drifted slowly along, blanking out random sections of the town.

A hundred yards from his goal, John removed his boots. He held one in each hand so that he could run along the sidewalk silently. Looking ahead, he saw two animals, a large antelope and a moose, hitched to a private rail near the saloon.

Dana had mentioned a back door, but by the time John reached the swinging doors, he'd decided that his best bet was a frontal, deceptive approach. He swiftly pulled his boots on, then detached one of his holsters from its belt. He put the holster, gun still inside, on the sidewalk near the doors. A dab of street mud gave his remaining gun a neglected look. He also smeared a little mud across his face and removed his badge.

Then he stepped inside the saloon, stumbling like a drunk.

Two Mudslingers at the bar turned to appraise him. They were both male, both were wearing long black jackets, and both were bigger than John. One had a crisscross scar over his nose, a permanent sneer on his mouth, and an economy-grade hearing-enhancement: tall, upright ears that twitched around independently. The other had a feminine, pretty face with high cheekbones and long, flowing, jet-black hair. John was pleased that he didn't recognize either.

Rabbit-ears was holding Dana by her upper arm, forcing her to bend towards him, and the grip must have been painful. But Dana's expression was serene. Only a glint of fire in her eyes revealed any distress. There was no one else in the saloon. The sheriff's guns were thrown down on the counter like an insult.

John fought to match Dana's control and stared incuriously at the pair. Using a dull voice, he said, "Hey. You guys still open?"

The Mudslingers took in his sloppy appearance and single, dirty pistol and turned their backs on him. John's eyes narrowed. Larker had been right: these two were speed-enhanced, but their enhancements were limited. With care, they could be managed. Of course, he could simply shoot them. . . .

The idea was tempting, but John didn't kill people when there was an alternative. Besides, in this case, he had a better—if chancier—idea. The loss of these two would hardly dent Dirty Jake's

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gang, but if he could invoke a little terror, it might spread.

"Get lost, asshole," the pretty one said as if to no one in particular. "Go screw yourself, but somewhere else. We're *closed* for the night."

John used the final word of this charming little speech to cover the rush of his footsteps. . . .

Dana wasn't quite sure what had just happened. There'd been a blur of activity followed by a brief whining sound. She had an impression that John had somehow pulled her assailants outside, but details were sketchy. Her saloon was empty now, that much was clear. And two wide trails of black threads, four long scratches, and four black scuffmarks had joined the months-old burns in decorating her floor.

She rubbed her arm, already flowering with bruises, and considered whether she dared risk finding out what was happening outside. Angry voices penetrated the door, but the thick wood smudged the words.

Then what sounded like a single shot rang out and she couldn't help herself. She grabbed one of the sheriff's guns on the counter and ran to the saloon exit, her heart beating wildly. At the last second, she reclaimed enough presence of mind to merely push one of the swinging doors open a crack, but that was enough to see that John was still standing. She was shocked at how much relief she felt.

Then another outlaw rode up unexpectedly—a fussy, deadly little man who'd visited her bar far too often over the last several months. This new slinger and John talked quietly for a moment. They spoke politely enough, but Dana felt a tension in the air like an over-tightened guitar string about to snap.

Then, without warning, a rifle from across the street discharged, and John was suddenly running toward the hotel, idiotically turning his back on the three outlaws. Dana's normal good sense was overwhelmed, and she stepped out onto the sidewalk.

This was a horrendously bad idea. A normal, sane person never touches a gun in the presence of a hostile slinger, let alone *holds* one. Fortunately, all three gangsters had their eyes glued to the marshal.

Sheriff Larker hurried the last few yards to the saloon, his ears ringing from a new series of rifle shots. He acted quickly, taking advantage of everyone else's distraction to quietly pull the pistol from Dana's hand and return it to his holster. Only then did he turn his attention to what the marshal was doing. His jaw dropped.

John was high up on the hotel wall, *running* up an uncompromisingly vertical surface. He stopped directly above the third story window and its rifleman. At that moment, perhaps coincidentally, the rifle barrel was suddenly snatched back into the room.

Then, for one outrageous moment, long enough for even non-enhanced onlookers to doubt their eyes, John was facing downwards, standing straight out from the hotel wall like a human flagpole.

For John, events had proceeded at a far more deliberate pace. . . .

As he approached the gangsters in the saloon, he keyed himself up for maximum quickness. Speed, surprise, and momentum were his best friends here. John clutched both men by their jacket collars, shoving them forward while retaining his grip. Rabbit-ears instinctively pushed Dana away to counter the shove. Both gangsters fought for balance and reached for their guns.

John abruptly reversed directions and tugged hard. The Mudslingers went flying backwards off the barstools. The pair found themselves on their backs, half-stunned by hitting the floor, watching the ceiling shoot by. Rabbit-ears tried to draw, but friction between pistol grips and floor kept his weapons se-

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curely in their holsters.

John, almost squatting as he pulled, was having his own problem: controlling his temper. He'd gotten a glimpse of the bruises on Dana's arm.

He pulled the men through the doors and onto the sidewalk. He gave them a final hard tug and then jumped upwards and forward. The outlaws kept going; they flashed by under his boots. Momentum dragged them several yards into the street. John spun around in midair and landed facing his enemies.

Rabbit-ears and Pretty-face should have appreciated their new location. Just as their backs began to notice how much heat and abrasion their passive journey had engendered, nice cool mud quenched the fires. But neither Mudslinger seemed grateful. In fact, after a brief duet of howls, the gangsters jumped to their feet, their faces murderous. Dual plumes of whiskey breath steamed in the chilly air.

By this time, John had reattached his abandoned gun and holster. He measured the scene carefully by eye. He'd set up this confrontation so that he could do some intimidating shooting, but he hadn't counted on the mud in front of the saloon being so soft. The outlaws were standing nearly ankle-deep. The small change in angles opened an extravagant opportunity. He had a slim chance to perform something close to a miracle . . . if he had the nerve to try.

John moved a short step leftwards before assuming the traditional slinger dueling posture: knees slightly bent, arms crooked and out from the sides, hands open. His intent was as risky as it was fancy. But if he missed, perhaps enough mud had forced itself into his opponents' holsters to buy him a few extra milliseconds. . . .

"Think you can handle *two* of us, asshole?" Pretty-face spat, his short-term memory evidently defective.

"Shut up, Bob," muttered Rabbit-ears, thereby seeming brighter or more sober than his partner. The illusion was spoiled when the Mudslinger continued. "Let's not start a *debate* here: let's just shoot the fucker."

Both gangsters went for their guns. But before their blurred hands covered half the distance, John had drawn a Colt and fired four times. Such firing speed required "double fanning": using a free hand to smash the hammer both back and forth.

An ordinary person wouldn't have seen John draw or return the revolver to its holster, or heard more than a single shot. These Mudslingers weren't ordinary. They managed to follow some of the action, although neither got the full picture. For them, time seized up like a bad bearing as they waited for pain to start and death to follow. Meanwhile, their hands kept moving, but when they closed, they closed on emptiness.

Numbly, both gangsters looked down at their gun-belts. Each holster had been cut cleanly on the outside; all four guns were settling into the mud slightly behind them. The extremely recent sounds of metal striking metal finally registered, along with a vague sense that something had just tugged at their holsters. John had angled each shot to not only slice through leather, but to graze the swinging cylinder of each weapon with enough impact to send it flying.

The demonstrated magnitude of John's abilities cut through the dimness of Mudslinger minds the way his slugs had slashed through their holsters. Neither dreamed of moving.

John reloaded slowly, keeping his face from showing any hint of triumph. He tried to act as if he did such stunts daily, sometimes blindfolded. "Boys," he said in a bored voice, "I'll make this simple. Don't let me see either of you in Sunstone again. Questions? No? In that case, don't let me keep—"

Several noises interrupted John's final admonition. From behind him, the saloon doors opened a crack; from the north, ragged footsteps announced that

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Sheriff Larker was getting close. But primarily, the sounds of a rider galloping in from the south made the marshal shut up and listen.

John had thought he could identify the species of any Paladin steed by the character of its gait. This time, he had no idea what was coming. And when rider and mount burst from the fog, John got a double shock. He'd never encountered an animal of this type before—like a cross between a giant skunk and a badger—yet its rider was all too familiar: a top slinger named Malachite Preston, infamous in nine states and six counties as the Greenstone Kid.

Malachite was a tiny man with a triangular face, an enormous handlebar moustache, a sharp horizontal ridge of hard bone on his forehead for infighting, and mouse-like eyes. His clothes always looked freshly pressed and he'd named his gold-plated guns (reproductions of the Colt 1851 Navy revolver) "Mother" and "Father." Despite this bizarre affectation, no one mistook him for a family man. He looked as pleased to see John as John was to see him.

Bracketed by moustache fringes, Preston's adam's apple bobbed up and down as if warming up for a high-jump.

"Evenin' there, Marshal. Hadn't a clue you were in town."

It should have stayed that way, John thought, tilting his head back to meet Preston's gaze; the outlaw's peculiar mount stood with its head and tail down, but its back arched high. "Evening, Malachite. Interesting beast you're sitting on."

"Sure is."

"Badger?"

"No, but you're sniffing up the right family tree."

"*Mustelidae*?"

"You got *that* right. This here is a modified *Gulo gulo*."

John stepped back a pace. "A wolverine?" A giant wolverine would be extraordinarily powerful and highly aggressive. "I thought they were extinct."

"Not quite."

John's gunshots had awakened Sunstone. People were beginning to stir, peering furtively from behind barely opened doors or through tiny gaps in window-curtains.

Suddenly, the marshal lost his usual appetite for unusual animals—and for small talk. "Don't tell me you're working for Dirty Jake now?"

"So are these two morons, unfortunately."

"What you waiting for, Greeny?" Pretty-face hissed. "Hurry up and shoot the bastard."

"I should shoot *you*, Hal! Did Jake say you could come to town tonight? I don't think so. You two assholes have balls where most people keep brains. Shit, dog-balls are smarter than the two of you combined. Don't you know who this is?"

John knew Dana was listening from the saloon and Larker, still bleeding, had gotten close enough to overhear. But before the outlaw could continue, something small and very fast slammed into the mud near Pretty-face's left boot, raising a small geyser of muck. The forceful crack of the rifle that had just fired pulled John's gaze toward the third floor of the hotel.

Didn't Larker, he wondered, say *bad* ammo?

Preston had whipped a gun out, but his startled animal ruined his aim by wheeling around.

"Hold off!" John ordered, already running. "I'll handle this!" he shouted over his shoulder.

The prudent tactic here was to quickly erase the incompetent assassin with a well-placed bullet. But when Larker had told Coby Patterson's story earlier, John had been uncomfortably reminded of his own long battle with loss and self-hatred.

If John was going to be practical for once, he should eliminate Preston too. If the Greenstone Kid got a chance to whisper a certain word in Dirty Jake's

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ear, John might need that epitaph sooner than expected.

While the marshal was willing to kill in an emergency, this was no emergency. He was already halfway across the street, deliberately drawing fire, watching the rifle barrel try and fail to track his swift progress. Aside from that first shot, Patterson was no threat—one-armed drunks seldom win marksmanship contests.

John used a hotel window's reflection to keep an eye on the gangsters behind him, in case anyone decided that a marshal's back made a good target. John wasn't overly concerned about this threat either; the Greenstone Kid had survived this long by carefully measuring risks.

Yet, he absolutely could not let Preston get away. So he had to keep the little slinger from realizing he *needed* to get away. Several options were open and to keep his audience distracted, John chose the most colorful.

It is possible for a normal athletic person, even on Earth, to run some distance straight up a vertical wall. Timing and confidence are key. You run at full speed toward the wall. At the last instant, you jump, lean back, and if you've moving quickly enough and the wall holds, momentum can provide enough traction to allow you two or three quick steps upward.

John was faster than any non-enhanced athlete. Also, he weighed 20 percent less than he would have on Earth, which didn't decrease his mass, the soul of inertia.

The hotel seemed to be rushing towards *him*. A short stretch of awning over the entryway was located inconveniently, but the required detour would only make this trick more entertaining.

The challenge was gaining enough speed in the muddy street; he'd have to use the far sidewalk for a final burst. One other minor problem: he hadn't practiced this maneuver for twenty years. ■

To be continued!

International arbitration may be defined as the substitution of many burning questions for a smoldering one.

—Ambrose Bierce

Nothing in life just happens. You have to have the stamina to meet the obstacles and overcome them.

—Golda Meir

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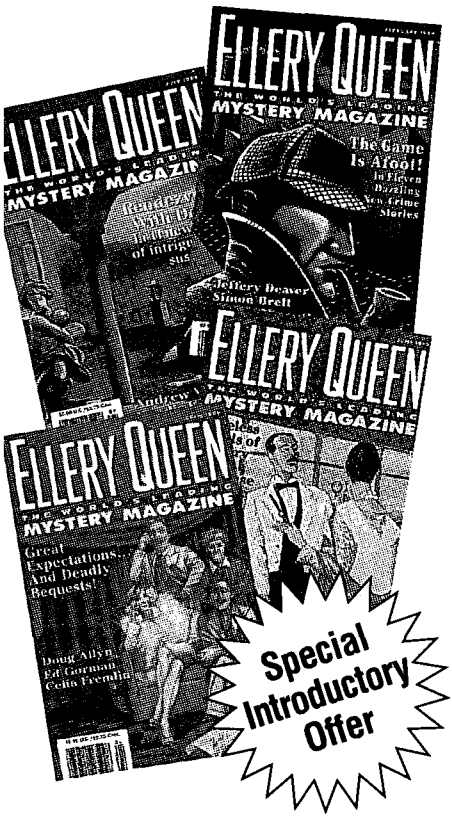

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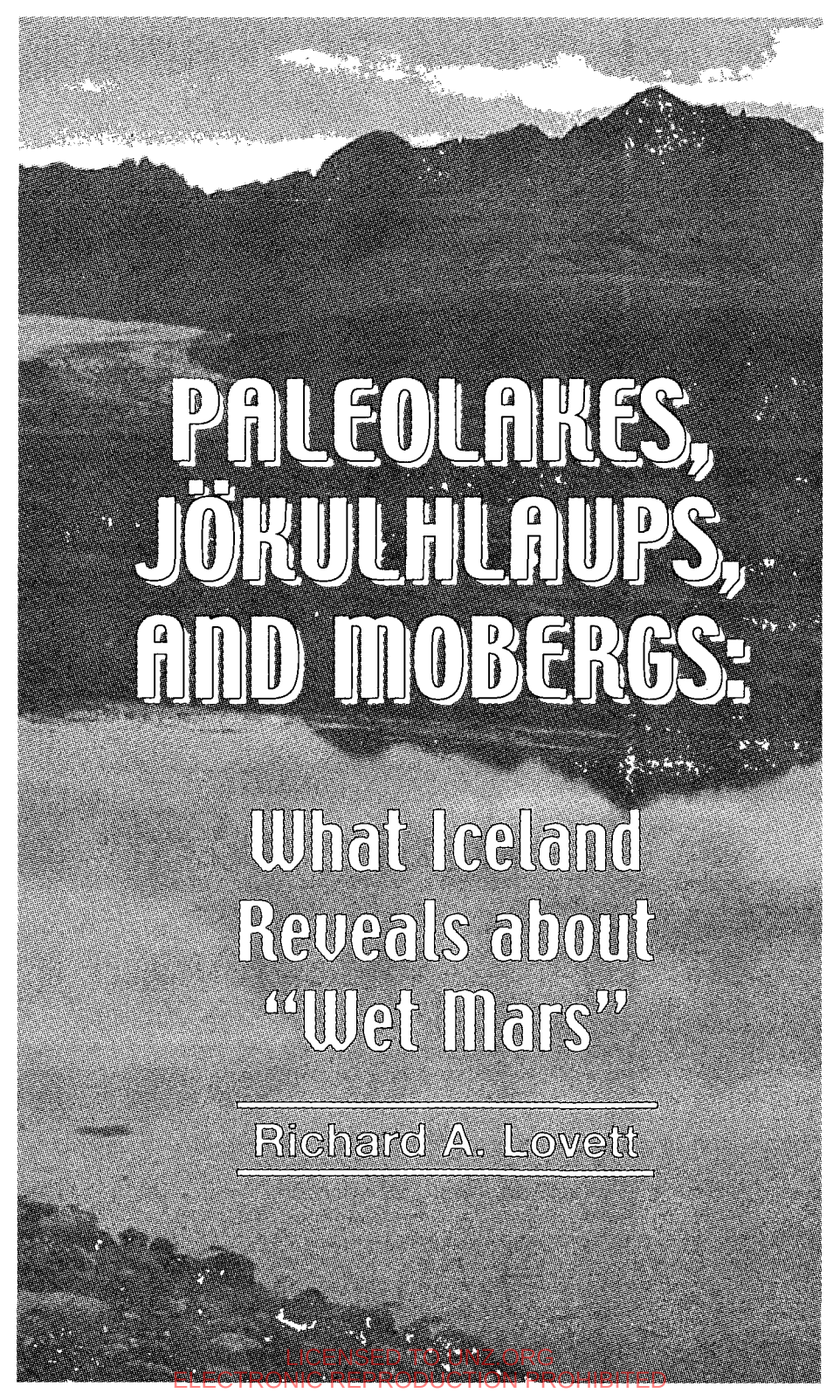

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August in Reykjavik, Iceland, is a mix of the familiar and exotic. On the one hand is the usual crush of vacation-minded folk preparing to hit the great outdoors before summer breathes its last. On the other is a climate in which "summer" resembles April in Seattle, Washington.

In Icelandic tourism, the name of the game is "rain shadow"—an issue of being on the sunny side of the island, away from the prevailing storm track. If you're Icelandic or rich enough to afford some of the word's priciest car rentals, you drive. Budget-minded visitors ride buses.[1] That means that you become overly familiar with the nation's primary bus hub, about a mile from downtown Reykjavik.

I was on a hiking vacation with a few days to kill between major treks, when I found myself in that bus station, trying to decide if the weather was telling me to visit Keiko the whale, or head the opposite direction to the Snæfellsness peninsula, jumping-off point for Jules Verne's *Journey to the Center of the Earth*. Stalling, I was reading travel brochures when I stumbled across a poster listing upcoming cultural events in Reykjavik. To my amazement, one was an international conference on Mars polar science and exploration.

Perhaps because Jules Verne was already on my mind, I was instantly intrigued. Try as I might, I couldn't come up with a reason why the conference should be held in such a pricey destination, other than the convenient location midway between Europe and North America. Eventually, I shrugged, visited Jules Verne country (in sunshine), and followed that with a four-day trek through the starkly beautiful highlands of central Iceland. I didn't know it at the time, but by traveling, I'd found my answer. A few days later, when I begged my way into the conference as a science writer, I learned that Iceland may be one of the closest earthly analogs to prehistoric Mars. The scientists, many of them Icelandophiles like myself, flock here to see in real life the landforms that tantalize them on satellite photos.

We've all seen the headlines. "Making a Splash With a Hint of Mars Water,"[2] "A Dripping Wet Early Mars Emerging From New Pictures,"[3] "A Wetter, Younger Mars Emerging,"[4] and the like, inspired by satellite photos showing features that could only be caused by erosion. Water, it appears, may once have scoured the Red Planet in substantial quantities: flowing, pooling, and fanning out to sculpt canyons, lakeshores, and deltas.

How "wet" is "wet" remains an open question. In 2000, Michael Malin and Kenneth Edgett of San Diego based Malin Space Science Systems, Inc., released photos showing scalloped cliffs that looked as though they had been undercut by seepage from a line of springs—a truly stunning finding.[5] A few months later, French geomorphologist François Costard responded with photos from East Greenland showing similar formations in granite bedrock where springs had never formed. Water was still at work, but in Greenland, the gullying had

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[1] Icelandic buses function as trains do in the rest of Europe—in part because that nation, with a population of under 300,000, has no rail system. A classic Icelandic joke involves a phrase book that coaches tourists in several Scandinavian languages. One phrase, dutifully rendered in Icelandic, is, "When is the next train to [destination of your choice]?" Icelanders know the real answer: "Never."

[2] Richard A. Kerr, *Science*, 30 Jun 2000, pp. 2295-2297.

[3] Kerr, *Science*, 8 Dec 2000, pp. 1879-1880.

[4] Kerr, *Science*, 4 Aug 2000, pp. 714-716.

[5] Michael C. Malin and Kenneth S. Edgett, "Evidence for Recent Groundwater Seepage and Surface Runoff on Mars," *Science*, 30 June 2000: 2330-2335.

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been produced by trickles of snowmelt, repeating year after year.[6]

Sadly for those hoping for a steamy prehistoric Mars, earthly terrain shows that as long as you have snow or ice, you don't even need warm temperatures to obtain water for sizeable rivers. Cold-climate dwellers know this intuitively—their rivers don't freeze to the bottom during even the most bitter cold snaps—but the best evidence comes from the Dry Valleys of Antarctica, where there is no chance that the liquid might simply be left over from warmer days.

The Dry Valleys, as I've discussed in these pages previously,[7] are a freeze-dried desert that hasn't thawed for thousands or millions of years. They're "dry" because they're largely ice-free, but they do have water, melting out of mountain glaciers that extend partway down the peaks that hem them in.

The heat source that produces this liquid water is the Sun. On clear days, sunlight penetrates the top layer of ice, where it is absorbed by the relatively opaque boundaries between crystals. Because ice is a fairly good insulator, enough heat accumulates at these points to cause melting. Microscopic rivulets trickle downward until they emerge from beneath the glacier as a modest-sized river. The effect is magnified by reflecting-oven conditions on the sunward sides of ice blocks or other terrain irregularities.

Today, there's not a lot of meltwater, but researchers have found traces of vanished "paleolakes" from the last ice age. Although that was a time when the Dry Valleys were even colder than today, the rate of melting appears to have been much higher than at present. Shorelines have been found from an ancient lake that was 1,700 feet deep and perhaps 80 square miles in area.

Why would a colder climate produce a bigger lake? B. L. Hall of the University of Maine posits that the colder Paleolithic climate may have reduced the number of storms by creating enough extra pack ice to force the nearest open water several hundred miles farther offshore. Fewer storms would mean more sun and more melting, despite the lower temperature.[8]

If Antarctica can generate big lakes during an ice age, then Mars needn't have been anything we'd recognize as temperate to have done the same. Even in the wan Martian sunlight, streams might have gushed from beneath glaciers, cut canyons, and flowed into icy oceans, even if the climate never got close to the freezing point. This would require more water than we see today, but most of it could have cycled from glaciers to ice-covered oceans, with only a small amount flowing freely at any time.

Noah's Lake

So far, we've generated lakes and streams, but not floods. On Earth, these are generally associated with hurricanes, monsoons, and other events that spread a lot of moisture over a large area. It's highly unlikely that Mars was ever *that* wet. But we can produce a big flood

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[6] Kerr, "Rethinking Water on Mars and the Origin of Life," *Science*, 6 April 2001, pp. 39-40.

[7] "Living at Extremes: Antarctic Lakes Yield Lessons for Mars, Europa, and Beyond," *Analog*, February 2002, pp. 48-60.

[8] B. L. Hall (2000). "Extensive Lakes in the Dry Valleys (Antarctica) During the Last Glacial Maximum: Implications for Past Lakes on Mars," in *Second International Conference on Mars Polar Science and Exploration*, p. 61. LPI Contribution No. 1057, Lunar and Planetary Institute, Houston (hereinafter referred to as "conference proceedings").

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with less water by finding a way to drain a lake in a hurry.

One mechanism for this is if the lake was created when a glacier surged across the path of a stream. This is another topic that I've discussed in a previous *Analog* article (in the context of global climate change),[9] so I won't repeat the details. Suffice it to say that such ice dams are highly unstable and can give way catastrophically, producing wonderful floods.

At least one satellite photo has even given a hint that Mars may once have had surging glaciers. What the photo shows is a kinked *esker*.

An esker originates as a river channel beneath a glacier. With time, it fills with debris melted out of the glacier, so that when the glacier recedes, the streambed has been converted to a snaky ridge, up to 500 feet high.[10] Eskers are common in parts of the American Midwest, where they trace the melting of the great continental ice sheets.

Martian landforms that look like eskers are one of the better indicators that the planet once had glaciers extending beyond its present ice caps. But a kinked esker is even more intriguing, looking like a snake with a broken back. On first impression, that's baffling. But similar eskers show up—where else?—in Iceland, associated with glaciers that have been known to surge and retreat, folding older eskers into accordion-like pleats called *concertina eskers*.[11]

Fire + Ice = Jökulhlaup

Surging glaciers damming modest-sized lakes are all we need for a flood big enough to catch the attention of a Martian Noah. But eskers, paleolakes, and glacial surges might actually be a red herring. We don't need them to produce martian floods; we don't even need warm enough temperatures for sunlight to melt the ice. That's because Mars once had a much better source of heat. Mars had volcanoes. And that, more than anything else, is what brings Mars scientists to Iceland.

As its name indicates, about 12% of Iceland is covered by ice, mostly in large icecaps that rise against the horizon like surreal mounds of congealed fog. But the entire island is volcanic, much of it very actively so—and in places, the actively volcanic and the icy overlap.

Dramatic things happen when volcanoes meet glaciers. If hot ash falls onto a glacier from above, the ice melts quickly and sluices downslope in a destructive mudslide called a lahar.[12] But the really spectacular events occur when an eruption occurs *beneath* the ice. In Iceland, this has happened often enough that there's even a word for it: *jökulh-*

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[9] "Sedimentology Gone Wild: The Onion-Layer Approach to Time Travel," *Analog*, September 2002, pp. 52-63.

[10] Most eskers are nowhere nearly so tall—and ironically, the 500-foot behemoth lies far from the nearest modern glacier. It is found in the western Sahara Desert, preserved from a time, 440 million to 600 million years ago, when Africa was part of the Antarctic. N. Mangold (2000). "Giant Paleo-Eskers of Mauritania: Analogs for Martian Esker-Like Landforms," conference proceedings, p. 120. The fact that scientists can find and identify such a feature on Earth, after so many eons, is a strong indicator that the Martian climate can also preserve the tracks of long-vanished glaciers.

[11] J. Nussbaumer, et. al (2000). "Evidence for a Surging Ice-Sheet in Elysium Planitia, Mars," conference proceedings p. 137.

[12] Some Martian volcanoes show signs of large mudflows that look like lahars.

[13] English-speaking tongues tend to tangle over Icelandic words, but the key here is that the "j" is pronounced like a "y." Icelanders boast that their tongue is the closest the modern world has to offer to ancient Norse—and they revel in its complexities.

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laup.[13]

Subglacial eruptions begin gently. As the lava wells up, ice melts and turns to steam that melts more ice—but at first, the steam, lava, and water are all trapped beneath 1,000 or more feet of glacier. Seismometer needles may jiggle, but a person standing directly on top of a minor eruption might not even notice it. In a big eruption, the glacier might fracture into a vent that spits steam and ash onto the snow above, but often the only visible indicator that anything is going on is a gradually expanding depression in the ice cap, as layer after layer melts out from below.

On a steep slope, the water flows away beneath the glacier. But beneath a large, flatter ice cap, water is trapped in a subglacial lake. Eventually, the dammed-up meltwater finds a way out. Typically, it does so in an enormous rush—the jökulhlaup.

Small jökulhlaups are local phenomena, like cloudburst-caused flash floods in the American Southwest. Big ones are awesome spectacles, as glaciers gush forth torrents of water the color of chocolate milk with sufficient force to roll 15-foot boulders downstream.

Iceland's most feared source of jökulhlaups is the volcano Katla, which lies beneath Myrdalsjökull, a 250-square-mile mantle of ice that reaches thicknesses of up to 3,000 feet. The largest recent outburst, however, came from beneath a bigger but less active ice cap called Vatnajökull.[14] This flood, on November 5, 1996, peaked at a flow of 1.8 million cubic feet per second, giving Iceland the brief honor of having the world's second largest river, and converting a span of the nation's longest bridge into a pile of twisted metal. The worst outflows from Myrdalsjökull, of which there have been several in recorded history, were probably six times larger.

In previous centuries, untold numbers of Viking and Icelandic farmers died in jökulhlaups, but modern seismology has given scientists the tools necessary to issue warnings to jökulhlaup-prone regions. These regions are easy to identify, and therein lies their relevance to Mars.

Characteristically, jökulhlaups rearrange landscape in two major ways. On steep slopes, they carve canyons—flowing so fast and hard that they can even rip apart bedrock. Iceland's most dramatic canyon is Jökulsargljufur (which means "glacial river canyon"; Icelandic is a very literal language), a 20-mile long trench, averaging 1,600 feet wide and 300 feet deep. Geologists believe it was created in one or two days by the largest known jökulhlaup, which gushed out of Vatnajökull about 2,500 years ago. On flatter terrain, the flood slows down, spreads out, and drops its load of debris, building a substantial delta, called a *sandur*—a remarkably smooth plain in a land that is otherwise one of the most mountainous on earth. Sandurs can be inland or coastal, occurring wherever the jökulhlaup loses momentum en route to the sea. They can also be quite extensive; the Myrdalsandur (below Myrdalsjökull) covers more than 250 square miles, and it is by no means Iceland's largest.

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[14] As you may have guessed, "jökul" is Icelandic for "glacier." Vatnajökull is the world's third largest ice cap, measuring about 100 miles by 60 miles, and soaring from sea level to an elevation of about 6,000 feet. Many of the details in this article come from Oddur Sigurthsson, et al (2000), "The Jökulhlaup on Skeitharársandur in November 1996: Event, Discharge and Sediment," conference proceedings, p. 155. Other details are from other presentations at the Reykjavik conference or from the *Lonely Planet* guide to Iceland, Greenland, and the Faroe Islands, an indispensable fact-book for aficionados of the North Atlantic.

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Just as a single flood can carve a canyon, a single outburst can build or substantially enlarge a sandur. For example, the last major outburst from Katla, in 1918, shoved the coastline more half a mile farther out to sea.

Mars has canyons aplenty—and it has deltas that might be sandurs. Does this mean it has also had jökulhlaups? Nobody can say for sure, but it's certainly one of the more interesting wet-Mars hypotheses. One of its advantages, as Icelandic experience indicates, is that a lot of erosion can be done in a single event. A "fossil" glacier sitting atop a dormant volcano (something we'll get to in a moment when we talk about permafrost) is all that we need for substantial erosion, even in a gradually drying Mars. Given the vast erosive force of a jökulhlaup, the event need only happen once in any given location; we don't need a martian climate that is snowy (wet) enough to support repeated cycles of glacier formation and flood.

What evidence is there that Martian floods were actually jökulhlaups? One sign was found near the 1997 Mars Pathfinder landing site, which shows all the signs of catastrophic flooding but has streambeds peppered with mysterious craters, up to about 300 feet in diameter. A group of researchers from the U.S., the U.K., and Iceland found a possible explanation for these craters by watching the outflow from a "small" outburst from the Myrdalsjökull two years after the Pathfinder landing.[15] The researchers observed large blocks of ice washing out from the glacier, later to be stranded as the flood receded. On Earth, when such ice blocks melt, they leave behind depressions called kettle holes. Myrdalsandur is liberally strewn with kettle holes similar to the craters found at the Pathfinder site. If the Martian landforms are also kettle holes, that would imply that the Pathfinder site was once swept by floods bursting from beneath a vanished ice cap.

Questing for Maars and Mobergs

So far, we've looked at the ice melted by a subglacial eruption, but not much at the lava. Equally distinctive things happen to it.

Some of the details are locked into the chemical structure of the rock. For example, the rock's composition carries signatures of the amount of water present when it was formed. It also reveals the pressure at which the rock solidified (i.e., whether it was on the surface or deeply buried) and the rate at which it was cooled (e.g., by encounters with water or ice). Rock samples from Martian volcanoes will tell us a great deal about their history, but this article is about landforms that can be seen from space.

When lava hits water or ice close to the surface, the water turns instantly to steam. Without enough overlying weight to contain it, the volcano erupts with a blast like a meteor impact, leaving a crater to match. Such craters are called maars, from the Latin word *mare*, for ocean.

After the explosion, one of two things can happen. The eruption may shut off, having spent itself in the initial blast. A few miles east of the Cascade Mountains in Oregon, a maar formed in this manner bears the highly descriptive name Hole in the Ground. A mile across, perfectly circular, and several hundred feet deep, it lies in nearly flat terrain, with such an inconspicuous rim that you barely notice the crater until you've practically stumbled into it. Hole in the Ground looks like it was formed instantly and has remained untouched ever since.

Alternatively, the volcano may contin-

[15] James W. Rice, Jr., et al (2000). "Field Investigations of Icelandic Jökulhlaups as an Analog to Floods on Mars," conference proceedings p. 146.

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ue to erupt. That may ultimately build a conventional volcanic cone atop the maar, making it hard to identify, or it may simply build up a rim of spatter around the original explosive pit, only partially filling it. Hawaii's famous Diamond Head is a maar that appears to have been built up in this manner.

The classic setting for the creation of a maar is when an eruption occurs beneath a marsh or an area rich in shallow groundwater. But a maar can also form if an eruption occurs on the floor of a shallow lake or sea, where, again, there isn't sufficient overlying pressure to prevent a blast. One of the most interesting such maars is Fort Rock, formed on slightly lower land, not far from Hole in the Ground. Here an eruption beneath a shallow ice-age lake created a ring high enough to stand above the surface of the water. Wave action in the lake then eroded the outside of this ring into a sheer cliff, leaving a circular "fort," reminiscent of an inverted bottle cap.[16] Finding such a formation on Mars would be a strong indicator of a planet warm and wet enough to support shallow, unfrozen seas or lakes—the warmest, wettest Mars imaginable.

Iceland, not surprisingly, has many maars. In addition, one of its lakes, called Myvatn, has formations called pseudocraters, formed when lava flowed into its shallows. The lava trapped pockets of water, which boiled into superheated steam, then exploded. The lava flow, now exposed as a chain of islands, is pockmarked with circular depressions, ranging from 10 to 1,000 feet in diameter.[17]

Finding such features on Mars is a holy grail for proving the warm-wet-Mars hypothesis, and hopeful scientists have reported suspect Martian maars since at least the late 1970s. Unfortunately, it's difficult to distinguish a maar from an ordinary volcanic crater, and a swarm of pseudocraters is going to look a lot like asteroid bombardment. Newer data from the Mars Orbital Laser Altimeter helps scientists create contour maps of such features,[18] but to date, these maps have done more to debunk hoped-for maars than to find new candidates. Perhaps undiscovered maars lurk on the planet's surface, masquerading as other types of features; perhaps the planet never had the abundant surface or groundwater necessary to form them.[19]

When lava rises beneath thick ice, the weight of the overlying glacier prevents an explosion. Instead, the lava forms two characteristic features, *hyaloclastic ridges* and features that Icelanders call *moberg* mountains (called *tuyas* by geologists from other lands). The ridges are long, narrow, and sharply peaked. Mobergs are sheer-sided, looking like they've been formed by Jell-O molds. The most famous is Herthubreith, which rises above a sandur desert, to an eleva-

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[16] Fort Rock is an Oregon state park. Hole in the Ground is administered by the U.S. Forest Service. Descriptions of both of these areas are based on personal observations, guidebooks, and interpretive signs at the sites. The deserts of central and eastern Oregon are a paradise for people interested in unusual, little-visited volcanic landforms—but four-wheel drive is required to get close to many of them.

[17] Myvatn is one of the nation's most popular tourist destinations. Its flocks of volcanic islands help make it a haven for ducks, and a world-class birding site.

[18] Richard A. Lovett, "The View from Space: Satellites Predict a Lot More than Weather," *Analog*, February 2001, pp. 48-59.

[19] As I was completing this article, researchers unveiled photos at the 2001 fall meeting of the American Geophysical Union, Dec. 10-14, in San Francisco, of the latest set of suspect maars. Alternatively, they might be tuff rings—created when there's a bit less water. Either way, the search goes on.

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tion of 5,500 feet.

The two types of formations are geologically very similar, and more than 1,000 have been identified in Iceland's most recently active volcanic regions.[20] Both occur when eruptions are constrained by the surrounding ice, causing the lava to solidify rapidly, rather than spreading outward like a normal flow. The result is a "volcano" that is far steeper than the norm. The principle difference between hyaloclastic ridges and mobergs is that the former tend to be softer, more easily eroded, and shaped like inverted Vs, while the latter rise like sheer-sided table mountains, made of substantially more solid rock. If a moberg pokes through the top of the glacier that crowned it, it often wears a more conventionally sloped volcanic crown, like a conical party-hat. The distinction between mobergs and hyaloclastic formations is at best, however, rather vague.

Icelandic geologists presume that Vatnajökull and Myrdalsjökull are underlain by hyaloclastites and mobergs similar to those seen in nearby areas that are now ice-free. Finding such features on Mars would be another strong indicator that the planet might have had not only more ice than it now displays, but also jökulhlaups. Moberg-like formations were recently reported in Valles Marineris, an enormous martian trench that dwarfs any valley on earth.[21] These mountains indicate that the valley may once have been at least partially ice-filled.

Some scientists believe that the terrain features of Mars are better explained by the interaction of lava and buried ice, rather than surface glaciers. That way, the lava could have caused jökulhlaups without ever reaching the surface—or if it did break through, not have formed distinctive glacier/lava landforms.

Earthly permafrost is generally shallow, and not thick enough to supply enough moisture for a jökulhlaup. But those seeking an analog for thick ice on Mars need look no further than Iceland, where researchers have found that ice buried by volcanic activities can persist for at least 600 years.[22] In theory, there's no reason why such fossilized snowbanks can't be even thicker and longer-lived than any that have been discovered to date—and permafrost created in this manner needn't have started out as warm, wet soil that subsequently froze. That's helpful in devising Mars theories that don't require the planet to be *too* warm or *too* wet.

Iceland's most recent and best-dated buried ice deposit is in the vicinity of a volcanic crater called Askja. Now a major tourist attraction for those willing to brave a 12-hour, four-wheel-drive bus ride, Askja blasted out Iceland's deepest lake (700 feet) in 1875. The midwinter eruption also blew 0.5 cubic miles of ash and cinders into the stratosphere and onto the surrounding landscape, burying (and insulating) enough snow that seven-foot layers could be photographed in 1939, 64 years after the blast.

Slightly older buried ice was exposed by erosion from the 1996 Vatnajökull jökulhlaup, and ice estimated to have been buried more than 600 years ago has been found in other parts of Iceland.

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[20] S. P. Jakobsson (2000). "Subglacial and Submarine Volcanism in Iceland," conference proceedings, p. 85.

[21] Mary Chapman, "Putative, Large and Small Volcanic Edifices in Valles Marineris, Mars, and Evidence of Ground Water/Ice," presentation P21C-11, American Geophysical Union, San Francisco, Dec. 11, 2001.

[22] J. Helgason (2000). "Ground Ice in Iceland: Possible Analogs for Equatorial Mars," conference proceedings, p. 72.

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The message is simple: even in a "warm" earthly climate, buried ice can persist for a long time. On Mars, "long" might be measured in millions of years, giving plenty of time for a subsequent eruption to find a buried glacier and release its waters in a canyon-and-delta-carving torrent.

Spiders, Fans, and CO_2 Jökulhlaups

Suggestive as the Martian landforms are, the "wet early Mars" hypothesis is by no means proven. Alternative theories make the young planet a far stranger place. And nobody doubts that contemporary Mars is distinctly unearthly, with winters cold enough to freeze carbon dioxide out of its thin atmosphere. In fact, scientists estimate that each winter, fully one-third of that atmosphere deposits as CO_2 frost at the planet's poles, only to evaporate again the following spring. The mind boggles at trying to imagine what the Earth would be like if our atmosphere did the same.

Even so, some of the strangest Martian findings have Icelandic links. One such oddity surfaced in 2000, when satellite photos revealed transient features near the south polar ice cap that looked like tangled knots of dark-hued rope. Closer examination revealed multi-limbed, vaguely radial designs that earned the moniker "black spiders"—although to some eyes, they look more like nests of mating snakes.

Aerial photos on Earth have never seen similar structures, but Hugh Kieffer, a planetary scientist from the U.S. Geological Survey in Flagstaff, Arizona, suggests that they might have something in common with features found, among other places, in Iceland. Presenting his theory in a conference room less than an hour's drive from the Icelandic town that gave the world the term "geyser," Kieffer suggested that the black spiders might be distant relatives of geyser-like steam vents called fumaroles. But instead of spouting volcanic gases, as do earthly fumaroles, the martian ones may be short-lived conduits for hurricane-force jets of CO_2 gas produced as spring sun vaporizes the winter's accumulation of CO_2 ice.[23] The gas emerges through relatively small holes, somewhere near the center of the spiders. The legs are subsurface gas channels running along the bottom of the ice, visible through its transparent surface. Earthly geysers and fumaroles also have steam channels, but they're in rock where we can't see them, and they tunnel vertically, rather than horizontally.

The martian summer may not be warm in human terms, but it certainly is by the standards of frozen CO_2. Kieffer and his coworkers calculated that during the spring, solar heating vaporizes up to 20 pounds of CO_2 per square yard each day. And they propose that in the black spider regions this happens not from the top down, as one might expect, but from the bottom up. The spider's legs collect gas from areas tens to hundreds of yards in diameter, conducting it beneath the surface to weak points where it fountains free in roaring jets. Dust carried with the gas may then deposit atop the ice in spreading "dark fans"—another type of newly discovered ice-cap feature extending hundreds of yards downwind from the presumed sites of the CO_2 jets.

All of this can only work if the ice is transparent enough for solar warmth to be conducted well below its surface. Otherwise, the CO_2 gas would simply drift away, as it does on Earth from a block of evaporating dry ice (which is comprised of frozen CO_2). Lack of transparency is no problem with pure CO_2 ice, which is clear enough that 75% of sunlight will penetrate at least 18 inches

[23] Hugh H. Kieffer, et al (2000). "Annual Punctuated CO_2 Slab-Ice and Jets on Mars," conference proceedings, p. 93.

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into it, but the ice that condenses out of the martian atmosphere is so heavily contaminated with dust that it's opaque.

Kieffer has proposed a mechanism by which sunlight can purge that dust from the ice. Sun-warmed dust motes, he says, will easily become hot enough to evaporate adjacent CO_2. In fact, compared to the temperature of frozen CO_2, they will become so hot that they will dance in little air bubbles, like water drops in a frying pan. If the bubbles are near the surface, the vapor pressure may be enough to crack the ice, ejecting the dust. Otherwise, gravity will cause the dust particles to tunnel deeper into the ice until they drop completely through it, like a slow-falling rain.

So far, this isn't much different from what happens to a black rock sitting on an earthly snowfield. But now the "weirdness" of Mars takes over. Because the Martian atmosphere is predominantly CO_2, chilled by its contact with the remaining ice, the microscopic tunnels are continuously re-closed with fresh ice, condensed from the air. The result: an increasingly transparent, self-sealing layer of CO_2 ice.[24]

Meanwhile, CO_2 gas is building up beneath the ice, which may be about a yard thick. That gas must go somewhere. Kieffer predicts that small channels will feed into larger ones, like merging raindrops on a windowpane. Where these big channels break through to the surface, he calculates that the gas velocity will be high enough to keep the jets open throughout the 150-day CO_2-evaporating season. He doesn't know how large these vents might be, but if they're spaced 100 yards apart and have diameters of one yard each, enough CO_2 would funnel through them to produce wind speeds in excess of 120 miles per hour.

Kieffer is the first to admit that his ideas are speculative. "I can make a wonderfully consistent story—which may or may not be what's going on," he says.

Other speculative theories also involve carbon dioxide. It has been suggested, for example, that Martian erosional features might be created not by water, but by liquid CO_2.[25]

Carbon dioxide most commonly exists as a gas or an ice that "melts" directly into the gas. That's why dry ice is "dry"—the liquid never gets a chance to form. Liquid CO_2 can occur, though, at high pressure—as for example, at the base of a thick enough CO_2 glacier. If this liquid accumulates, rather than flowing away, the stage is set for a CO_2 jökulhlaup. The destructive force of the flood would be increased by the tendency of the liquid to start "boiling" into gas the moment the outburst carries it out from under the weight of the overlying glacier. That, in turn, accelerates the flood by creating a ground-effect cushion beneath the remaining liquid, allowing it to roar downstream at amazing speeds.[26] A CO_2 jökulhlaup could even form kettle holes if the lowlands wind up peppered with bergs of CO_2 ice broken off of the overlying glacier. Eskers

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[24] This is drawn from R. A. Lovett, "'Spiders' Channel Mars Polar Ice Cap," *Science*, Vol 289, 15 September 2000, pp. 1853-54.

[25] Nick Hoffman, "White Mars: A new model for Mars' Surface and Atmosphere Based on CO_2," *Icarus*, August 2000, p. 326.

[26] The most dangerous eruptions from earthly volcanoes work similarly, blasting downhill on cushions of volcanic gases at speeds well in excess of 60 miles per hour. In this case, the gases are hot, and the flows are called pyroclastic flows. For an anecdotal discussion of these events by a man who's dedicated his life to studying them, see Richard V. Fisher, *Out of the Crater: Chronicles of a Volcanologist* (Princeton University Press, 1999).

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might also be possible.

Volcanoes could assist in this process, as magma bodies cause changes in subsurface temperatures or if ash piles up deeply enough atop a glacier to increase the pressure at its base.

All of this is far more speculative than the warm, wet early Mars hypothesis. But even if Mars proves to have always been in the deep freeze, one thing is likely to remain constant, and that is the fascination of Mars researchers with Iceland. Similar landforms speak of similar geological processes, and even if the parallels aren't perfect, where else can you fly into a modern airport, check into a luxury hotel, rent a car, and drive into terrain that resembles the Martian poles? ■

About the Author:

Richard A. Lovett holds a B.S. in astrophysics, a law degree, and a Ph.D. in economics, but since 1989, he's been that rare beast, a full-time freelance writer/photographer. He's written six books and more than 2,200 articles for a publication list that includes *Science*, *Popular Science*, *Backpacker*, *Sierra*, *Travel & Leisure*, *The Economist*, and most of the large newspapers in the U.S. and Canada. His diverse specialties include adventure travel, toxicology, remote sensing, ecology, environmental policy, food microbiology, and analytical chemistry. His latest project is a running book coauthored with Alberto Salazar, three-time winner of the New York City Marathon.

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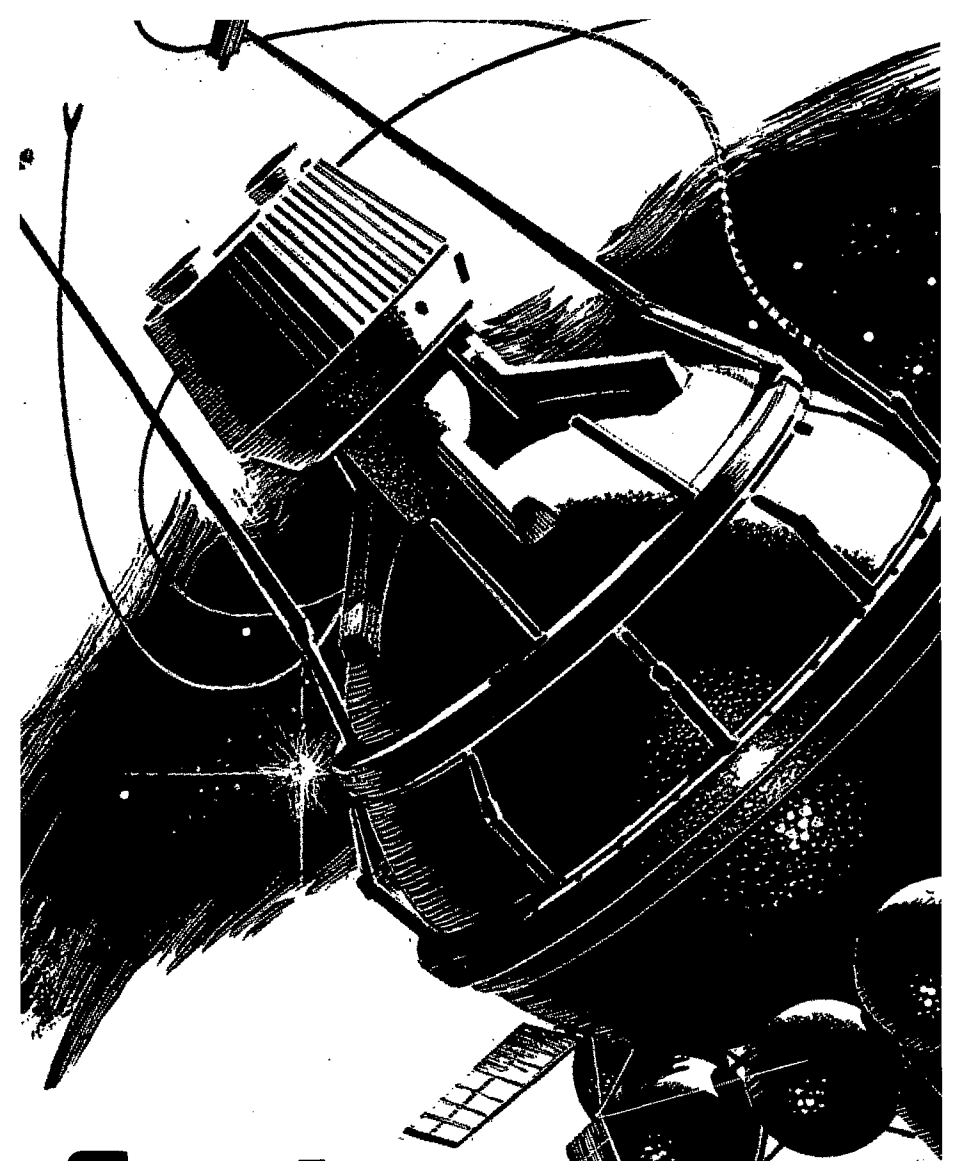

Capture Radius

Stephen L. Burns

Illustration by Vincent DiFate

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One man's garbage is another's stock in trade—and, either way, potentially dangerous.

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"*Blackened salmon,*" Serena March said half under her breath, breathing those two magical words like a prayer, like the name of a lover. Her gray eyes, always so startling against the dark skin of her face, were tightly shut. She could *see* a sweet and flaky, spice-crusted fillet resting on a blue china plate. Next to a big pile of fries, hot from the deep-fryer. Saliva flooded her mouth.

"Excuse me?" Uriah said. His synthesized voice had been cribbed from the old stage and screen actor James Earl Jones. It was deep, mellow, resounding.

Intrusive. The food fantasy crumbled, not even leaving any crumbs behind. She sighed, opened her eyes. "Just talking to myself, Uriah."

"Ah. Pardon me."

This was an exchange she had with the *Balding Urchin*'s main computer several times a day. Immediate response to any spoken order was a necessity, but the constant *whats?* she got from talking to herself were a real pain. And after ninety-two days of being cooped up alone in part of a fifteen meter sphere circling the Earth, a girl was bound to start talking to herself. Not to mention having food fantasies. Sex fantasies. Plain old opening a door and stepping outside fantasies.

Beating the computer to a mass of bent wires and cracked boards fantasies.

"We are approaching capture radius of the next major contracted object," Uriah intoned, as if trying to be useful and make up for the interruption.

Serena sat up straighter in the pilot's chair. Over the three months she'd been taking the *Urchin* through its trial run she'd gained a few pounds. Not from overeating, nobody could gain weight on the freeze-dried flug she had on board. Some of it came from lack of exercise, some from long exposure to zero gee, some from zero gee drugs which made her bloat and retain water. The weight gain had only softened her lean frame, but about a month before she'd gotten fed up with squeezing into her coveralls and just started living in underwear and tee-shirt. The shirt was faded green, and bore the same logo as the billed cap jammed down over her short curls: a stylized planet Earth with the MORE logo superimposed over it.

"How hot is the object?" she asked.

"Pretty hot."

"Great. How long until capture radius?"

"Four minutes, twenty seconds."

"Hey! That's long enough to go get a coffee first!" Coffee was the one real food item aboard, her one real pleasure. She could endure saw-dust flavored tuna casserole and Chicken Disappointment, but not instant coffee.

"Yes—ah, wait. You have an incoming call."

She made a face. Calls always seemed to come at a bad time, like when she was sleeping or in the head. "Who from?"

"Your father."

"I guess for him my coffee can wait. Put him through."

A moment later her father's image appeared on the big screen before her. John Henry March looked nearly as broad-shouldered and strong as the fabled black hero whose name he bore—as long as he was seen from the waist up. The withered legs and wheelchair, unseen on the screen, spoiled the image.

"Hey hon," he said with a grin. "Got a spare minute?"

Serena smiled back. "Sure. How are you doing, Pop?"

"Just fine, darlin'. Everything okay up there?"

She shrugged. "I haven't gone space-happy yet. The giggling and drooling are just my new hobbies."

"Glad to hear it." His smile faded. "Look, darlin', this isn't a social call. There's a big problem headed your way. Actually, you're headed toward it, too."

She frowned. "Like what?"

"You're going to be entering New

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Moscow's neighborhood fairly soon, right?"

Serena glanced up to the upper right corner of her screen, where nav plot was tiled. "Yeah, I'll pass by within 700 klicks in a couple hours. So?"

"Vasily Svetlanachev just contacted me. There's some real bad stuff happening over there."

"Bad *how?*" She had friends on the orbiting platform.

"His information is still fragmentary. Just as he was getting an ultimatum, he also got a short message someone on the station snuck out. Basically what's happened is that three men who rotated in yesterday as replacement crew have hijacked the place."

She shook her head. "How the hell do you hijack an Orbiting Industrial Platform?"

March sighed. "They had arms, and they took over. Vasily's pretty positive it's Russian Mafia. They're demanding a lump sum and an ongoing percentage of the station's profits be sent to offshore accounts, or people start dying. In essence they're trying to grab a chunk of the *ivanium* action."

That made sense—if crime ever made sense. The dozen-odd OIPs existed and survived because they could provide materials which could only be produced in zero gravity: diverse patented composites and alloys, pharmaceuticals, matricized laminates, crystalline growths, and exotic compounds. Ivanium fell into that last category, a room-temperature superconductor heavily used in the construction of new generation microprocessors.

"Okay, thanks for the warning. I wasn't planning to stop by for a drink, anyway."

He shook his head. "There's more. One of the men who took over the platform somehow managed to trigger an emergency dump of their main LOX tank. The place uses the old-style air handlers, which depend on a steady and fairly heavy oxygen feed. The dump destabilized their orbit, and they're running out of air fast. Vasily has already arranged for an emergency delivery, but that won't reach them in less than sixteen hours. He figures they've got enough to last six hours, seven tops."

That was bad. As was what their sudden dangerous shortage meant to her. "And I'm sitting on a whole bunch of cubic meters of the stuff."

"You got it. No one and nothing else is even close."

She regarded him bleakly. "Okay, I can see that they need what I got. Are you telling me I should walk into this mess and give it to them?"

His answer was quietly and grudgingly delivered. "I'm not sure you have much choice, love. There are over sixty people—hostages, essentially—on that station. Without your help they're all going to die."

"Okay . . ."

"There's one more thing."

She let out a bark of laughter. "What? Aliens are after me or something?"

"According to ground tracking, a tug left New Moscow an hour ago and is heading straight for you. Vasily and I figure someone is coming to make *sure* they get some of your oxygen."

Serena pulled off her MORE cap and rubbed her scalp. Her hair felt greasy, another side effect of the zee-gee drugs. "So how should I handle this, Pop?"

He sighed. "I wish to hell I knew."

Uriah broke in. "Capture radius in one minute."

Serena jammed her cap back on her head. "I got to go."

"How are you going to handle this mess?"

"When I figure that out I'll let you know. Any good ideas, let me know. March out."

The laws of orbital mechanics and the constraints of contract law gave her no more time to think about what her father had just told her. She had a job to do, and was in just the right place to do

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it. It was a job no one else was doing, even though the need for it had been in existence and growing for decades.

John Henry March had become one of the five wealthiest men in America not by chance, but through a combination of vision and drive. The grandson of a junkyard owner, he'd started out in the middle nineties running a one-truck recycling service, concentrating on the removal of office machines and dead computers. Over the next fifteen years he'd built March Recycling into the largest, most efficient materials recovery company in the world.

When zero gee materials processing discoveries at the end of the first decade of the new millennium had kicked off the New Space Race, John Henry March was already looking upward and wondering if there might be a place for his company up there.

March Orbital Recovery Enterprises still might never have come into being had it not been for two factors. The first was a daughter who, instead of joining the family business or becoming a jet-setting heiress, had first become a Navy pilot, and then an astronaut who did two stints on the International Space Station.

The second was the Disaster of '10, when a chunk of a defunct Chinese spy satellite crashed into the ISS, killing twelve. Serena lost friends in that accident, and found a new mission in life. One she and her father could achieve together.

In the three months since the *Balding Urchin* had begun its maiden voyage it had gathered almost four thousand pieces of space debris, ranging from paint flecks the size of a rice grain to one whole and two partial satellites. Along with two cubic feet of marble-sized drops of frozen liquid metal coolant from the reactors in old Soviet era satellites. Tiles from the old Space Shuttle. Anything recoverable which came within reach.

Contracts with Oriental Orbital, EuroStar, New Moscow, and other OIPs had her sweeping their orbital paths for potentially dangerous debris. Three satcom companies had contracted retrieval of dead birds.

Never one to miss a bet, her father had used his clout, public outcry, and insurance industry pressure as levers to help induce NASA, EuroSpace, and anyone else who had assets in space to collectively create a fund which paid a bounty for every piece of debris collected. His argument, which he made stick, was that just because something wasn't a threat to one of their assets now, didn't mean it wouldn't be one later. In orbit, what went around came around.

Unless otherwise specified by contract beforehand, any debris collected became the property of MORE. Some of it was even re-sellable as materials which would be cheaper to reprocess than to haul up out the gravity well.

The *Balding Urchin* was the oddest looking spacecraft ever built, its peculiar form following its unusual function. The pressure cabin which had earned it its name was a fifteen meter sphere housing controls and living space. A ring of ten stumpy outward-pointing legs wrapped around its middle. A second ring of eight legs was forward of that, halfway to the buttresses which held the storage bin for collected materials. Maneuvering and braking motors, and three heavy hydraulic docking dogs were built around the bin's rim. Aft was a ring of fuel and LOX tanks, their surfaces crusted with solar panels. Behind that were the aft maneuvering engines, and the one big main engine.

Part of the trash collection was automated and under Uriah's control. Tracking data from Earth was integrated with images from the *Urchin*'s own high power radars to precisely locate debris within its reach.

And it had one *hell* of a reach. Each of the stumpy legs on its hull was a mount for a *tethacle*. The *Urchin* was equipped with two types of this combination teth-

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er/tentacle. Twelve were light duty, thin composite filament cables twenty kilometers long, each tipped with a small self-propelled collection device called a *grabbie*. Uriah tirelessly managed these tethacles, collecting the paint chips, bits of insulation, and other small fragments. This allowed the ship to sweep a zone around itself forty kilometers in diameter. Still, space is big, and they were in effect trying to clean a whole city with a Dustbuster. A daunting percentage of the debris they encountered was too hot—moving far too fast—to be collected, even with a mitt, a thick composite panel designed to absorb the impact of small fast particles. But even if an object wasn't captured, the *Urchin* provided data which refined the tracking of such objects. That created one more small revenue stream.

The other six tethacles were shorter and sturdier, their grabbies designed to collect larger and far more dangerous pieces of debris. Like the one they were going after now.

According to her readouts they were closing with a piece of the old *Mir* space station. *Mir* was long gone, but its memory lingered. It had shed like an old dog, littering space with junk.

The oversized screen before her had several views and readouts tiled across its surface. Navigation was a wireframe abstract of orbital data and radar returns. A pair of light tethacles were arrayed like the eyes on a crab, the cameras built into the grabbies providing a stereoscopic outside view. The camera in the heavy working tethacle poised to its full length five kilometers ahead of the *Urchin* brought her a clear view of the nearing *Mir*bit.

While the object didn't seem to be coming at her much faster than a speeding car in traffic, she didn't dare forget that the *Urchin* was actually coming up on it, and traveling at some ten Kps, which would be a radar-busting 21,600 mph back on the Pacific Coast Highway. Collision would be catastrophic. That was why the collection bin was forward of the pressure hull; it could, if necessary, act as a crash barrier. In theory, anyway.

"Looks good," Serena murmured.

"You are in the pipeline. But I have to warn you, capture parameters are well into the caution zone."

She laughed. "Yeah, it's a hot one."

"We can abort capture."

She shook her head. "Screw that. I'm the Junkman's Daughter. Mistress of Trash. Princess of Debris."

"Abort declined, my Princess. The object will enter capture radius in ten seconds. I know you hate countdowns, so I won't give one."

"Thanks." Her straps were cinched tight and her slippered feet were solidly planted on the foot controllers. She tightened her hands on the twin joysticks, took a deep breath. The nav display continued to change, gold crosshairs approaching a flashing red circle. This was going to be a tad tricky, like catching a flying cannonball with gum on a string.

The gold crosshairs went red as they entered capture radius. The number of seconds until her ship and this chunk of floating debris tried to occupy the same space began counting down in red.

Tethacles were magnetically fired from their pods to conserve propellant; a grabbie could hold only so much fuel for its onboard motors. The tethacle she was using was stretched to its full length ahead of her like a feeler, a slender line five kilometers long and no bigger around than a pencil.

Serena worked the stick controlling the grabbie at the tethacle's end. She didn't dare tag the object head-on, too much risk of it getting smutched. Instead she fired the grabbie's push and maneuvering thrusters, whipping it in alongside the asymmetrical chunk of metal heading at her. She energized the electromagnet in the grabbie's head.

"*Contact!*" Uriah called, confirming what she could see on the screens, and

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what dozens of other captures had taught her. It was a sort of Zen thing, becoming one with the *Urchin*'s peculiar systems and capabilities. The dharma of deep space dumpster diving.

"Gotcha, *tovarisch,*" she muttered as the grabbie welded itself to the slowly tumbling junk.

Now time became even more critical. Two things had to be done now, and done *fast*. She had to cancel out the tumble before it tied her tethacle in a knot, and start braking her acquisition so she didn't catch it in the chops. When, four hours back, she'd made the small correctional burns needed to get within reach of the thing, she could have lined herself up so she wasn't coming at it head-on. But she was a head-on sort of woman. Always had been.

While Uriah could handle small captures, this was the sort of task only a human with a pilot's reflexes and instincts could manage. Readings of axial tumble began whispering into her ear over her headset. She ignored them, gaze flicking back and forth between the plotting graphic and the realtime display.

Each grabbie was outfitted with one main and four steering motors. A crescent of studs across the top of the stick controlled them. Her thumb began jumping from one stud to another as she worked the stick, cracking off a shot, rolling, cracking off another.

"Tumble decreased by 82 percent," Uriah reported.

"Don't rush me." Gray eyes fixed on the realtime display, she waited half a second, twisted the stick and fired another shot with a steering motor.

"Tumble cancelled, main pusher lined up for braking. Object nearing at 600 mps relative, distance 3.4 klicks and closing."

Even before Uriah had confirmed that the tumble was cancelled, and that she'd lined it up so the grabbie was pointed back in her general direction, she'd begun firing its main motor. The line wasn't dead on; it was off just enough to make the object start veering off to one side. Using her feet to control the tethacle's winch, she had been hauling in slack cable. Now she let off for a bit as the tethacle began to arc.

The grabbie's main pusher could put out enough thrust to peel it right off the object it was attached to, which was the last thing she wanted to happen. So it had to remain fairly close to directly opposite the object's direction of travel.

"Four seventy-five mps relative," Uriah reported. "It will miss us."

Very close now, and going to miss her by a mere 300 meters, the object kept coming. The grabbie's main motor was a spot of blue fire on its backside. It looked like she felt after the freeze-dried chili.

"Come on baby," Serena coaxed, hand on the stick as she kept the braking burn lined up. The object swept past, dragging the trailing tethacle behind it.

The damn thing wasn't decelerating fast enough. She had a tiger by the tail. Her feet worked the winch, taking up slack, then inducing a bit of drag. But she dared not use much; that would roll her prize off braking line.

"Four hundred."

She was already initiating Plan B, sending a second heavy tethacle sweeping in to intercept the object, its grabbie motor at full burn.

"Easy now . . ." The second tethacle reached and crept past the object. A twist of her left stick sidestepped it as close as she dared. The grabbie's electromagnet pulled it home, locking it down about thirty degrees from the first. Closer would have been better, but this would have to do.

"Three fifty. Approaching limit."

She let off boost on the first. A series of fast blips on both grabbies' maneuvering burners got it pointed the way she wanted. Both main burners ramped back to max.

"Three hundred. Slowing faster now. Two seventy-five. Tether limit in seven

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seconds."

Maybe she should have braked first, come up on it easier. But she was shooting for absolute minimum fuel usage, using small early corrections to adjust her orbit, and braking only when she had to. If she could complete the full 120 day run, collect all contracted captures and as much other shit as possible, and do it with the least fuel possible, she'd be going a long way to prove MORE's economic feasibility. Then maybe one day an entire fleet of *Urchins* would be at work, making space safer for man and machine alike.

"Just so you know, small ship spotted on radar, 5000 klicks and closing. Capture at ninety-five mps relative. Too fast."

Numbers at the top of her screen showed the distance until tethacle limit was reached. Two hundred meters. One ninety. Seconds left until tether limit counted down slower than realtime as the object slowed. But they were still disappearing too fast.

"Come on . . ." Fifty mps was the threshold. The grabbies' magnets would hold, and the tethacles wouldn't strip their winches or get ripped out of their sockets. She poised her thumb over the emergency release button. Better to lose the thing than get pulled apart like a crab on a dinner plate. *Crab. Oh god. Crabcakes! Don't get distracted!*

"Seventy mps, 117 meters left."

So close. Just a few more meters of slack would do the trick. Her feet worked the winches. No slack left.

Her right hand darted to the stick's base, punched buttons, slaving both tethacles to one stick and transferring manual ship control to the other. Then she swung that stick and fired her steering motors, rolling the *Urchin* forty degrees off line in the direction of the tethacles—

—giving them about ten meters more slack.

"Fifty-seven mps, new limit in two seconds."

"Gonna be a bump—"

The *Balding Urchin* lurched and shuddered as the tethacles snapped taut, angular pull making it roll even more. Warning buzzers shrilled.

Serena coaxed her ship back onto line. Red lights on her boards went back to green.

Only when the *Urchin* was back on track did she check to see if it had worked.

Trailing behind her at the end of two tethacles was her prize.

"Capture successful," Uriah said, sounding surprised.

"You had doubts?" She slumped back and let out a heartfelt *whew.* "Take over nav and put that puppy in the basket."

"Aye aye, Cap'n."

She pried her fingers off the sticks, fumbled her harness loose, stood. "I think I just earned a drink."

Five minutes later she settled back into the pilot's seat, one hand wrapped around a warm sippy cup of hot black coffee with just the tiniest splash of Goldschlager cinnamon schnapps added to it. Not enough for a buzz, really. An edge-rounder.

"We're being hailed," Uriah informed her as she strapped in.

So much for peace and quiet. "That radar contact you told me about when I was otherwise occupied?"

"Yes. It's that tug from New Moscow your father talked about."

Serena took a sip of coffee, pondering her options. The capture hadn't given her time to think about how she would deal with the situation on New Moscow, and now it was too late. You didn't blow off hails, that was both written and unwritten law. No time to consult with her father. All she could do was wing it.

"Okay, I'll talk. Voice only. I'm still in my undies, you know."

"Connecting." There was a low chime, then a typically scratchy and hollow helmet voice issued from her speakers. "*This is the* Balding Urchin *I am*

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speaking to?" The voice was a rather nice tenor with a fairly thick Russian accent.

"Sure is," she replied breezily. "Captain Serena March. Who am I speaking to?"

"*I am Mikhail Vladimirovich Koryenko, station engineer from New Moscow. We are having a bad emergency on-station, our main LOX tank being dumped by accident. We have only a few hours breathing left. Have come seeking your help.*"

This made her scowl. She'd spoken with Mik Koryenko on several pass-bys, discussing sweep progress and gabbing about mutual passions for hot airplanes and old sitcoms. Mik was a ten star hunk and, unfortunately, five by five gay.

"Pleased to meet you. Sounds pretty bad. But if you're having such a bad emergency, why are you out here cruising the neighborhood?"

"*I have come hoping to convince you to come to station. Loan us oxygen to hold us until fresh supply arrives.*"

His story had more holes in it than a five-year-old pair of pantyhose, but she let it slide. What she really wanted was a sense of his intentions.

"I'm not sure I can do that," she began.

His voice turned hard. "*You must.*"

"Hey, fella! I do favors. I don't take orders. It's a captain thing."

A long pause. "*Sorry.*" He sounded more grudging than repentant. "*I mean you must do this or many people will die. This is why I have come in tug. I can be helping you change orbit, and in braking for rendezvous. Please, we need this oxygen you carry very bad.*"

Right, she thought. You screwed up, and are about to choke the golden goose dead. She checked her nav display. The tug would reach her in about twenty-two minutes. What were the odds that this guy would just take what he wanted if she said no?

Too high. He had to be one of the ones who'd taken the platform over. No way they'd trust anyone else to leave.

Anyone with the gall to hijack an OIP wouldn't hesitate to steal a ship. But if she cooperated, she could stay in control of the *Urchin*. And New Moscow did need that oxygen.

"All right, you can help get me there. But first I've got to query my ship's designers. She was never built to be towed. I don't want her to get wrecked in the process."

"*I would not be hurting your craft.*"

"Not on purpose. Just let me double-check. Keep coming, I'll get back to you in about five minutes. March out." She cut the connection before he could argue, then called her father.

John Henry March didn't look any happier than she felt. "Do you really think letting him take you under tow is wise?" he said, sounding like he sure didn't think so.

Serena shrugged. "I'm not sure I have much choice, Pop. Aside from any strong-arm tactics he might pull, New Moscow needs LOX, and I'm the only one close enough to get some to them in time. I might be able to rendezvous on my own, but it would blow a big chunk of my fuel and LOX reserves in the process."

He held up a hand. "Look, if you're worried about—"

"Making money? You're goddamn right I am! I'm up here to prove that the *Urchin* works, and that what it does is economically feasible. I'm not gonna let some vodka-swilling mobsters screw that up."

March studied his daughter's face a moment, then nodded. "I know better than to try to change your mind. The only help I can offer is information. Vasily managed to ID the hijackers. Two are just muscle, career leg-breakers. But the third is a former cosmonaut who got the boot for stealing assets from the Russian space program and selling them on the black market. His name is Stefan Borodin. Ever heard of him?"

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"No, but he has to be the one flying the tug. He's the brains of the outfit?"

"So it would seem."

"All the more reason for keeping him close by so I can keep an eye on him."

"I suppose. I'm still not very happy about this."

"That makes two of us, Pop. But don't worry. This bozo may think he's capturing me and my ship, but capturing shit is what this ship and I do for a living."

"So you'll allow him to take you in tow."

"Yep."

"Then what?"

"I haven't figured that part out yet," she admitted.

Telling her would-be/maybe hijacker that she needed to consult about where the tug should latch on had been a lie. The *Balding Urchin* had been her baby every step of the way. In the days immediately after the disaster of '10 she'd remembered a story she'd read as a teenager, one about a craft designed to sweep space for debris. The first design had been scratched out on a cocktail napkin, and based on what she remembered of the story. The final design had been the product of a think group consisting of her, her father, a half-dozen carefully chosen aerospace engineers, and the writer of that story, who had teleconferenced from a frozen island in northern New York. She'd worked full time with the engineers who translated the design into something which could actually be built, and with the contractors who had provided the various components.

After that she'd been on hand when its components were boosted into orbit from Gagaringrad, and then gone up to oversee its final assembly at a dock/depot built from recycled upper stages just off the EuroStar OIP. She knew every bolt, wire, motor and chip in the thing.

The *Urchin* had been designed to only dock at its depot. But any one of the three hydraulically extended docking dogs around the cargo bin would provide a safe push-point. Extending one to full length gave the place for the tug's clamps to grab.

The chatter back and forth between Serena and the fake Mik Koryenko during the docking process was terse and confined to the task at hand. While Borodin might have been a thief and a hijacker and a thug, she had to admit that he was a fairly good pilot. He brought the tug, which was little more than a heavy open framework fitted with engines, towing lugs and clamps, and a webbed basket for a space-suited pilot, in with a firm, sure hand.

"*Commencing first burn in ten seconds,*" he told her once both were satisfied the connection between the two craft was secure. This terminology was literal; the tug's engines used pellets of solid fuel.

"Ready when you are," Serena returned agreeably.

"*Burn in five . . . four . . . three . . . two . . . one. Burn initiating.*" There was a bump and soft groan from the *Urchin*'s hull. Acceleration settled her back in her seat.

"You *hate* countdowns," Uriah said, sounding prim.

"Roger that." She toggled her pinmike on. "How do we look?"

"*All reads nominal.*"

"Great. How long to rendezvous with New Moscow?"

"*I am reading one hour, ten minutes estimated.*"

"Check."

Hopefully that will be long enough to let me figure out what the hell to do next.

From the very first, women in space have had one big advantage and one giant drawback. They are the same thing: their sex, and the fact that they were generally outnumbered by men, many of whom wanted a piece of this scarce resource.

Serena knew that there was a fairly

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good chance that Borodin knew what she looked like. Her father had milked every facet of every step of MORE's progress for every drop of publicity it would bring. In the process the Junkman's Daughter had become something of a celebrity, appearing in every available media outlet. There was even an "unauthorized" swimsuit calendar, half the shots taken from when she was in college and on the swim and surfing teams, half "candid" beach shots taken by cooperative paparazzi. While not a pop diva or beauty queen, at age thirty-four she could—at least before the zeegee drugs puffed her up—catch the eye of most straight, non-afrophobic males. If they didn't mind the flat-chested type.

Just like in a bar in the desperate hours after midnight and nearing last call, a lone male spacer will patiently listen to anything a woman willing to talk to him has to say. Serena used that to her advantage, making herself keep up a constant stream of borderline-airhead gabble to keep Borodin distracted, and thinking she was just some chattery chick who'd been in orbit too long.

At that moment she was telling him about when she and her father had gone to Gagaringrad to watch the *Urchin*'s hull components get boosted into LEO.

"—so there was Pop, with this *killer* vodka hangover, getting loaded into a helicopter. This big old army surplus thing that made so much noise your teeth rattled. They strapped his chair down, and—hey! I just saw a flash up ahead. Is New Moscow in sight already?"

Her tethacle cameras relayed an image of his suited figure leaning forward, then settling back. "*I see nothing.*"

"Ha! Sergeant Schultz, right?"

"*I know no Sergeant Schultz.*"

"*Hogan's Heroes*. Old TV show. Fun and frolic at Stalag 13?"

"*I do not know this show.*"

"Hell, I know too many. I've got a brain full of punch lines. '*As God is my witness, I really thought turkeys could fly.*'"

"*This is joke?*" he said uncertainly.

"To me, anyway." With that she thumbed the trigger stud to light off the main thruster of the tethacle she'd been patiently lining up while she talked, creeping it closer like a snake stalking a big rat. The grabbie's main motor fired for a moment, flinging it forward.

Three seconds later the grabbie bashed into the tug's antenna, snapping it off. The grabbie clung to the broken shaft and carried it on out of sight.

"*Did you feel that?*" Borodin asked sharply.

She suppressed a grin. "Feel what?"

"*Was a bump or something.*"

"I didn't feel anything. Could've been debris in my forward bin shifting. That happens sometimes. I don't even notice it any more."

"*Could be, I guess.*" He didn't sound convinced.

"Gosh," she cooed. "You shouldn't be so jumpy. Now where was I?"

"*Could story wait?*"

"Sure. Why?"

"*I should be calling New Moscow, making sure everything is all right. Will do that, be back in couple minutes.*"

"No problem. Take your time." She cut the connection.

Uriah spoke up. "He can't call that far without an antenna."

"He sure can't. I'm going to offer to let him relay through us. That's where you come in. All his radio chatter so far is stored in your comm buffer, right?"

"Yes. You told me to keep a record."

"Good. Keep storing it. Break it up and analyze it, then use it to build a new speech synthesis set. At some point we want New Moscow to hear what I say in his voice."

There was a couple second pause while Uriah parsed this strange order. He wasn't really intelligent, he just sounded that way. But she was pretty sure what she wanted was within his capabilities.

"Understand what I want?" she

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prompted.

"*Da*, I understand you just fine," Uriah answered in Borodin's voice.

"Hey! That was pretty good! You help me pull this off and I'll get you something nice. Maybe a death ray or something."

There was a click, then Borodin's voice rattled at high volume out of the speakers. "*Captain March! Are you reading me?*" He sounded rattled, too.

Sweat, you bastard. "I hear you just fine. Is everything okay? You sound kind of funny."

"*I am not able to contact New Moscow. I run diagnostic on radio, am told antenna is broke or missing.*"

"No shit? How'd that happen?"

"*I do not know,*" he said, his tone harsh and accusatory. "*But I am thinking maybe you do.*"

"Me?"

"*Who else is here?*"

"Look man," she shot back in exasperation. "You're the frigging maintenance engineer. It's not my fault if your stuff is falling apart. Besides, why would I want to keep your from talking to home? We've got to rendezvous with the place. I sure as hell want to be able to talk to the place while we do it."

She listened to heavy, angry sounding breathing from Borodin for several seconds. "*However this happened,*" he said at last, "*I still must speak to station.*"

"You want to relay through me?"

More heavy breathing as he considered her offer. "*This I may have to do.*"

"Say the word and my radio is yours."

"*Da. I am left with no other choice.*"

"Okay, let me instruct my ship's computer." She raised her voice, leaving the mike open so Borodin could hear. "Uriah, patch Mr. Koryenko to New Moscow, any way he wants. And Mr. Koryenko, if I don't immediately respond afterward, don't get worried. I've got to go make a trip to the head." A pause. "Aw, shit. I shouldn't have mentioned that, what with you being stuck in a suit and all."

"*Go use head. Then I will contact station.*"

"The comm is yours. March out."

She unstrapped herself, stood up and pulled herself aft.

It was the galley she went to, not the head.

"Well, Uriah," she said as she fixed a fresh cup of coffee. "Can we eavesdrop?" It sure would be a big help if they could.

"Working. They're speaking Russian, and it's heavily encrypted. The Russian is no problem. Still searching for encryption key."

"Try Russian military. You should have keys. Dad didn't want anybody talking behind our back."

"Testing. Got it."

"Put it on my headset."

"*—not sure if the American woman suspects or not, Leonid Pavel. Losing my antenna seems like too much of a coincidence.*"

"*Could she be listening in?*"

"*Unlikely. I trust Boris, and the toys he gave us for this job.*"

"*I have seen pictures of this Junkman's Daughter. She could be of use here.*" A harsh laugh. "*Chocolate is just the thing for my sweet tooth. The one I keep in my pants.*"

"*Keep it in your pants for now. This ship of hers could be a very good asset.*"

"*See! We would get great asset and great ass! This sounds like the best plan of all!*"

"In your dreams, greaseball," Serena muttered, giving the air the finger.

"*We will see. If she causes trouble we may have to keep her and her ship. Maybe we will keep her anyway, she would surely be worth a great ransom. For now, get a transfer crew suited up and ready. We will reach the station in . . . twenty-eight minutes.*"

"*A good thing! It's not hard to breathe yet, but that time is coming. If Spatsky's farts don't kill us first!*"

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"It doesn't smell like roses inside this suit, either. Be ready, and stand by for my order to bring out the hose."

"I will be waiting to hose you as eagerly as a new groom with a virgin bride!"

"Good. Borodin out." There was a beep as he shifted from scrambled mode. *"Computer? Is Captain March there?"*

Serena shook her head.

"She's, ah, indisposed sir. Shall I have her call you when she's available?"

"Do that." He clicked off.

"Well," Serena said, sipping her coffee.

"Well what?" Uriah asked.

"Well, I guess I better call Pop."

Her father had anticipated what she might want, and had it all ready to upload: complete specs for New Moscow, the tug, and the suits used on the OIP; crew lists with names and pictures; anything which might conceivably help her deal with the situation. She kept the call short, partly because she didn't want Borodin getting any more suspicious, and partly because she really hated the worried look on her father's face.

Next she called her would-be hijacker. "March here. Sorry about the delay. I tell you, I'd give *anything* for a big package of prunes."

"Is good you called. We begin braking now. Wanted to warn you."

"I'm ready when you are,"

"Good. Braking burn in ten seconds."

"Don't bother counting down."

"We will brake up to .7g over ten minutes. Stop to make course correction, then make final braking burn." As he said that the *Urchin* shuddered as the tug began slowing the two linked craft. Weight settled over her.

"Sounds good. How close in are we going?"

"Fifty meters."

That was too close. She wanted to stay as far away from the station and Borodin's confederates as possible. "I'd sure like to be further out. More like 150 meters."

"Why?" Mistrust was back in his voice, and he was making less of an attempt to hide it. Because he wanted her to give him a reason to take her and her ship?

"For one thing, this tub of mine isn't that maneuverable in close quarters. Then I'm going to be handing over a big chunk of my LOX. Which means I'm going to have to go get more. The less messing around I have to do getting clear, the faster I can be on my way. So give me the 150 meters, okay?" She knew her argument was lame. How hard would he press?

"I am not sure hose will reach that far."

Borodin didn't know it, but he'd just proved he wasn't Mik Koryenko. If he had been a station engineer he would've known precisely from how far out he could and did take fuel and LOX. His answer also put her in a tricky spot.

"Come on, man," she said with a laugh. "Why are you holding out on me? I thought guys always bragged about the size of their hoses. I understood that your re-supply drones come within only 200 meters for safety's sake. You've got pipe to spare."

There was a long pause, then Borodin laughed. Or at least made a laughing sound. He didn't really sound amused. *"Ah yes, I forget. Worry about making transfer, yes?"*

"Stress will do that to you. I'm glad to help rescue New Moscow. I just don't want to need to be rescued myself later on. I'd make a really crummy damsel in distress."

"You will be safe. There is no need to worry."

"Then can I stay back the way I want? Pretty please?"

He hesitated, then said, *"Da. Sure."*

New Moscow was in sight. Serena studied the nav and radar reads, then the

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realtime display. Her father had warned her about this, but it was worse than she expected. *Much* worse. She reopened her line to the tug.

"Hey buddy. Your station is tumbling like crazy!"

Borodin came on. "*This is so. The accidental dump acted as motor, making place tumble and throwing it off original orbit. Without LOX, could not use primary station-keeping boosters.*"

"Uh huh." She had to wonder why he hadn't used the tug to cancel the spin and stabilize the platform instead of—or at least before—coming to shanghai her. The tumble really complicated things. To pace any given point over New Moscow's surface, the *Balding Urchin* would have to take up what amounted to a very tight geosynchronus orbit. One with a roughly 200 meter radius. "So how were you figuring to pull off this transfer?"

"*I was thinking we could use both sets of attitude engines to maintain station.*"

Serena shook her head in amazement. "While transferring *LOX?* I bet you smoke while you're filling your car's gas tank, too. Gimme a second to see if I have a better way."

She grabbed a light pen. "Uriah. Rough plot coming up." She leaned forward and sketched what she had in mind over the nav plots. The computer translated the sketch, passed verdict:

"Two chances in ten of it working."

She leaned back, gray eyes on the screen. Not great odds. But what the hell, it was better than one in ten.

"Here's the deal," she said, lapsing into her low, no-nonsense pilot's voice. "We're not mixing LOX and fireworks."

"*Transfer must be made,*" he began in a harsh, angry tone.

"Agreed. But I can see only one way to pull it off. My *Urchin* is designed to grapple onto moving objects. If I can get hold of New Moscow just the right way, then I can boost and winch myself into tethered orbit around the platform."

"*You can do this?*"

"I think so. This ship was built to latch onto things smaller than itself, but three heavy lines should do the trick. I've got more if I need them. But to pull this off I have to be in just the right position."

"*But . . . will not station tumble try to wind your lines around itself?*"

She'd already thought about that. "It's going to try. I may even have to let it do that a bit. But then I think I can use my attitude engines to unwind myself out straight."

"*This is not a good plan. Catching this station is not like catching fish.*"

"You think *yours* is better?" she shot back. "You want me to tank you up, then you let me do it my way. Otherwise I'll just go back to what I was doing and you can practice breathing vacuum. Or did you just plan to take my LOX if I said no?"

She regretted that last comment the moment it left her mouth, but there was no way to take it back. He already had to know that she knew—or at least suspected.

"*Make delivery the way you think best,*" he growled at last. "*Time is running too short for arguing.*"

"Good. I want you to stay locked on the way you are in case I need extra boost. Okay?" Not that she planned to use him. She just wanted him where she could deal with him better.

"*I will do this.*"

"Great. Now I've got to go off a few minutes and start setting up for this. You get us to a dead stop relative to the station, at 150 meters out, lined up equatorially with the direction of tumble. You follow me?"

"*I follow.*"

"March out."

"Come on, Uriah. This has got one chance in five of working!"

"Which means four chances in five of failure. That's not even in the yellow zone of capture parameters."

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"Don't be such a damn pessimist. You do your jobs and let me worry about the rest, okay?"

"You're the Captain."

"Damn right. And I never make you salute."

"Serena, sometimes you take stupid risks. Your father isn't here to say this, so I will: *Be careful.*"

Borodin was true to his word, bringing them in so they stood 150 meters off New Moscow, and dead over the equator of its tumble.

Once in position Serena deployed all eighteen of the *Balding Urchin*'s tethacles. Several of the light duty ones were set to maintain position relative to the *Urchin*'s hull, providing multiple viewpoints for scoping out the situation. Improving the view wasn't particularly reassuring.

"What the hell have I gotten myself into?" Serena muttered as she studied the situation. She was always up for a challenge, but this time she found herself thinking something easier might not be so bad.

OIPs fell into two categories: those which were designed with a spun section to provide artificial gravity, and those that weren't. New Moscow was one of the latter, a roughly cubical, unrelievedly industrial construct a hundred meters on a side made up of work pods, connecting tubes, storage tanks and bays. Its outer surface was a bewildering mass of pipes, antenna pylons, solar panels, dishes, pods, locks, and who knew what else.

The *Urchin* was oriented in such a way that it appeared to be rolling away from her, making an entire revolution in just a bit over forty seconds. Which meant the surface was spinning past her at roughly ninety mps relative.

Redline for the grabbies was fifty mps—and for objects with a hell of a lot less mass. This puppy was a monster, and the inertial mass of the *Urchin* wasn't something to be sneezed at either. She figured to start with three heavy tethacles, adding more if needed. Correct play of the winches would be a must. Too much strain and either the grabbies would lose their grip, or the tethacles would get ripped right out of their sockets.

"Only one chance in five," Uriah reminded her quietly.

She laughed. "Hell, the odds are twice as good as that! They're two in ten!"

"So you're still going to try." It wasn't a question.

"Haven't got much choice." She reopened her line to Borodin. "I'm going to attempt capture in just a minute. Is your suit's long-range radio reaching the station okay?"

"*Da, it is.*"

"Good. Tell the hose crew to stay inside the lock and wait until I give the word. Then skip the foreplay, run that hose, and get the transfer made and over as fast as possible. You better hang on tight. This could be a bumpy ride."

"*You are certain you can do this thing?*"

"Hell no. But I'm sure no one else could either. March out."

Serena wiped her hands on her already damp tee-shirt, then jammed her MORE cap down tight. It would help keep sweat out of her eyes.

If she was ever going to sweat a capture, this was the one.

One final check on the screen, taking in both nav and realtime views as she tightened her hands on the sticks. This would be like a cowboy on horseback trying to lasso a locomotive—and expecting to hook a ride for both himself *and* his horse.

"Yee-*haw*," she whispered. "Let's ride."

Three heavy tethacles from the forward ring had been slaved together. In her view they were up, lower left and lower right. The spacing should help spread the strain. *Should*. She'd had them maintaining station some fifty me-

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ters ahead of the collection bin, and just under a hundred meters short of New Moscow. She triggered their main thrusters, sending the tethacles reaching toward her quarry. Closing distance clocked down on the screen and whispered in the earpiece of her headset. Fifty meters. Forty. Thirty. She gave the *Urchin* a small touch of boost, starting it creeping forward. Then another.

"Now, Uriah."

At that command the computer followed its own instructions. The light tethacle it had been stealthily guiding through the open framework of the tug and up behind Borodin drifted closer to his back on incremental puffs of thrust. Light as a feather, it touched a certain spot on his backpack. Uriah triggered the grabbie's electromagnet. It locked on, the magnetic field it was putting out disabling the suit's long range radio.

"His LRR is out," he reported a bare second before Serena's own tethacles found their mark. They slapped down and began hauling the tethacles tight.

Feet feathering the winches, she goosed the *Urchin* after the lines attaching her to the station. The ship shivered as the tethacles began to take up the strain and haul her along even faster.

Her ventral attitude thrusters were at full burn, trying to shove her up and away. She paid out tethacle grudgingly. The more of it got wrapped around the station, the more chance there was of getting snagged on one of the myriad protrusions. She could brake with the winches, but they didn't have enough power to haul her back if she went too far. Two hundred meters was the limit.

The *Balding Urchin* groaned and shook as the tethacles tried to haul her forward and down, at the same time starting to wind around the station like rope on a windlass. Attitude burners were at full juice, trying to shove her up and away so she didn't get flattened on the station's side. Her ship thrummed and shuddered as it was wrenched between opposing forces.

Stalled dead in the middle.

" . . . well shit . . ." Thirty meters of tethacle was wrapped around New Moscow, and she was being forced to pay more out. On the screen the stars whirled crazily. The attitude boosters just weren't cutting it. Nor were they designed to run this hard this long.

What she did next was more the result of reflex than rational planning. "Uriah! Gimme three more heavy grabbies. Paired to the first three, slaved to mates."

"Working." Three more tethacles whipped toward the station's surface, cutting curving arcs as they swept down to lock on where she wanted. Seconds ticked by. Overheat warnings for the maneuvering motors began to flash.

She didn't dare wait any longer. Working the foot controllers like a concert organist, she braked harder on the ventral tethacles and began easing up on the upper. Warnings that those tethacles were reaching their load limit flashed across her screen, then downgraded from red to orange as Uriah got the extra tethacles in place and they took up some strain.

Now for the dicey part. She cut the aft ventral attitude motors and let off the winch brake for the upper lines. The *Urchin* yawed crazily and the hull began to creak from the unbalanced load. Warnings began shrilling again.

But this had changed her geometry. Now the *Urchin* was pulling at an angle, like a fish fighting the hook and line. Her axis was now pointed up and away from New Moscow—

—and she was being reeled down toward it even faster than before. Her thumb was already on the stud for the main drive. It flared to life, making the ship creak and shudder.

The *Urchin* struggled ahead and outward, beginning to unwind the tethacles wrapped around the station. She let off, fired again, balancing pull against grip. The trick was to use enough boost to reach the spot she was shooting for,

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but not so much that she snapped her connection and kept going. The *Urchin* slowly and painfully unspooled out from New Moscow, little by little the tethacles coming closer to being straight out from the station. It shook and jived as Serena worked the thrusters and winches to start her craft swinging out so it would be bow-on to New Moscow.

She reached tethacle end with a snap that made her teeth clack together. The ship continued to swing out, bobbing like a pendulum. It tried to overrun her point and start winding itself back the other way, but she managed to cancel the excess momentum. With a final shudder and groan the *Urchin* settled into tethered orbit around the spinning station.

"Can you maintain station, Uriah?"

"If I set another half dozen light tethacles."

"Do it."

"Already working. There. I have control now. We are secure, all engines shut down."

"Great." She let go of the sticks and let out a groan of her own. Worked her cramped fingers.

"That was a good job, Boss."

Serena laughed. "It was *insane*. You should *never* have let me try it."

Uriah let out a rattling sigh. "That death ray you mentioned? Can it be mounted *inside?*"

Time to check on her parasite passenger. "Hey there, Borodin. What did you think of my piloting?"

"*Was pretty good, but now—*" A sharply indrawn breath as he realized what she'd called him. "*Why are you calling me by this name?*"

"Because that's what it is, shithead. I know Mik Koryenko, and you ain't him. And yeah, your suit's long range radio is out. I killed that one, too."

When Borodin finally responded his voice was cold and hard, empty of the false friendliness of before. "*I get you for this, bitch.*"

"Bite me. I'm nobody's ass or asset."

"*Do not be so sure. I have two men on station. Together we will take your oxygen, we will take your ship, and we will take* you!"

"In your dreams. Uriah, reopen the channel he used before. I'll talk, you turn it into Borodin speaking Russian."

"Ready."

Okay, here we go. "Leonid Pavlovich! Are you ready to run that hose, or would you rather stand around and smell more of Spatsky's farts?"

"*We are ready.*"

"Then come on out. You can use the tether lines to bring the workers and hose out here. Remember, we're spinning. No free EVA, everyone and everything must be tethered."

"*The airlock is opening now.*"

"Good. Borodin out." A moment later she added, "There you go, Borodin. I'm you, and you're on your way to becoming just a number. You'll get a prison uniform with a big fat zero on it."

"*You can not get away with this shit!*" Borodin raged.

"Gotta go. There's work to be done." She cut the connection. Her tethacle cameras relayed the image of five spacesuited figures emerging from an airlock. Each wore a heavy workpack which provided thrusters for EVA maneuvers. They clomped their way across the station's outer surface like armored bugs on a giant dirty sugar cube, reaching the LOX refueling pod. Her aim had been good. The pod was only a few meters from one pair of tethacles.

They began unreeling the hose and hauling it toward the nearby tethacles. Once they snapped a guide ring around one of the pair, they tethered themselves to the other line and started bringing the hose out. Because of spin it was more a task of braking, not dragging. One worker stayed by the reel-pod, managing the hose as it spooled out.

"Uriah, I've got to be Borodin again."

"Ready."

"How do you like being outside in a

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spacesuit, Leonid Pavlovich?" she called heartily.

"*I do not like it one bit,*" Borodin's confederate answered sourly, Uriah providing a translation over her headset. Unused to suit work, he was already huffing and puffing.

"What, a brisk walk in the great outdoors does not suit you?"

"*Outdoors on Earth would suit me better.*"

"Remember, the next time you take such a walk it will be as a very rich man. You are doing well, getting those sheep to run the hose. But you all look alike in those suits. Which one are you?"

"*I—*" A pause. "*Why are you waving your arms like that?*"

"Like what?"

"*Like a crazy man. And pointing at the American bitch's ship?*"

Oh boy. "Well, I—"

"*Who is this?*"

"You know who I am!"

"*Then tell me, what is the name of that blonde dancer from Smolensk whose teeth you knocked out?*"

"Who can remember names?" This was going badly. She cut the connection. "Uriah. Get me on the frequency those hose handlers are using. My own voice."

"You're on."

"Hey you guys! This is Serena March! I'm here to help, but I need to know which one of you is the bad guy! Point him out!"

On the screen the space-suited figures halted their labors, looked around, and all pointed at the man lowest on the tether.

That one froze a second, turned around, popped thrusters and headed back down the line.

Serena sent a tethacle after him, but the only one she had to spare was way aft, and the man had too much of a head start. He hit the OIPs surface and began clomping back to the airlock as fast as he could.

The worker tending the hose-pod left his station and cut him off. The two figures collided, merged and spun, struggling like armored bears. She braked her tethacle, keeping it poised and ready just a few meters from them.

"*I got him!*" A familiar voice called hoarsely.

"Mik! Be careful!"

They'd wrestled around so that she'd lost track who was who. "Uriah! Triangulate on Mik's radio! I need to know which one is him!"

"Mr. Koryenko is—"

Uriah's answer became redundant when one of the figures pulled a heavy cutting laze from his workpack's holdits and began trying to bring it to bear on the other. "*He's armed!*" Mik shouted just before red warners glowed at the muzzle and the invisible beam lanced out, sweeping through space less than a handspan from Mik's helmet.

"*Mik!*" Serena screamed, reacting instinctively. She jammed on her stick and sent the poised tethacle rocketing forward. Its glowing tip whipped past Mik's helmet and slammed into the laze. The tool was torn from the other man's grasp and went flying away, turning end over end. She worked the stick, sending the grabbie snaking after it.

The thug shoved Mik back, turned, and leapt after his weapon. His feet left the decking badly, causing him to tumble. He spun for several seconds, the thrusters on his workpack firing erratically as he tried to cancel the spin. At last he got himself stopped—relative to the stars.

But the station was still rotating.

"*Watch out!*" Mik and Serena shouted in unison.

Their warning came too late. He turned just in time to see an antenna boom coming at him like a bat at a ball.

The boom smashed into him, flinging him away. A stream of vapor trailed behind him, twisted into spirals as his body writhed and spun. Then he went limp, rolling slowly end over end as he receded in the distance.

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"*Dermo!*" Mik gasped. "*Shit! His suit got holed!*"

"Sorry!" Serena wailed, horrified by what she'd just seen. Nobody should die in vacuum. Nobody.

"*Not your fault,*" Mik panted. "*He was stupid.*"

"Still." She slumped back and closed her eyes a moment. Behind her closed lids she could still see that deadly contrail. "Uriah," she said quietly. "Can you retrieve the body?"

"Yes. Working."

"Thanks."

"*Serena! Heads up!*"

Mik's shout snapped her eyes open and her body upright. "What?"

Even as she asked the question the answer was there for her to see on her screen.

Borodin.

The renegade cosmonaut had climbed out of the tug, somehow made his way across the docking dog, in from the collection bin, and was just reaching the *Urchin*'s pressure hull. In one gloved hand was a laze similar to the one which had nearly taken the top off Mik's helmet.

He swung it down to point straight at her hull.

She switched over to his low-power suit frequency. "What are you doing?" She tried to sound calm, unafraid.

"*I am going to fix you, bitch. You have one minute to get in suit, then I am cutting my way in. Your ship I will hold for ransom. You I fuck first, then ransom too. How many millions would I get for Junkman's Daughter? Twenty? Fifty?*"

"You can't—"

"*Fifty seconds left, whore. Forty-nine.*"

Serena started to unbuckle her straps, then let them stay. She grabbed onto her sticks, sending the tethacle nearest to Borodin arcing toward him.

"*Do not be stupid,*" he growled. "*I am not idiot grounder like Leonid.*" He fired a short burst from the laze into the hull of her ship, washing his suited figure in red. A warning shrilled from her board. "*Get in suit now, or I will cut my way in and sell your corpse. You have thirty seconds left.*"

Suddenly most of the free tethacles began to writhe and curl in Borodin's direction like the legs of an octopus.

Uriah! Her eyes swept across her screen and boards. He'd left her one free light tethacle to use. The heavies were all tied up keeping them tethered to New Moscow.

"*Twenty-five seconds.*" Borodin took aim and fired at a grabbie coming in his direction. It broke apart and the tethacle it had been attached to swept harmlessly past. By then two more were heading toward him. He lined up the laze and smoked both those grabbies as well.

By now it was becoming clear that the tethacles under Uriah's control were only coming close, and not actually aimed to strike. No doubt his programming wouldn't allow him to hurt a human with them.

"*Eighteen.*"

"Stop *counting,*" Serena hissed through her clenched teeth, guiding her tethacle through the other waving arms and up behind him. If Uriah could keep him occupied shooting at the grabbies coming at him then maybe she could knock the laze out of his hands, just like she'd done with the other guy. Borodin was at least smart enough to let it go.

"*Fifteen.*" Another grabbie got turned into melted scrap. It was now or never. She triggered the tethacle's booster to full power, sending it lancing in the laze's direction. Three meters. Two.

"*Fuck it. Time is up.*" Borodin suddenly turned around and swung the laze so it was pointed at her hull once more.

"*No!*" Serena tried to make the grabbie veer away, but Borodin had moved too quickly and the grabbie was too close. Now instead of heading for Borodin's weapon, it was burning straight for the faceplate of his helmet.

"*Wha—*" There was an explosive puff

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of released air, hellishly lit by the still burning main and steering thrusters. It flung a glittering cloud of silvered glass shards outward. Inside Borodin's helmet the grabbie's thrusters died.

Borodin's feet remained magnetically glued to her hull. Centrifugal force slowly pulled his slack arms up over his head, as if in a gesture of surrender. Too late. Shadow spared her a better look at what was left of his face and head.

"You got him," Uriah said quietly.

"I got him," Serena agreed woodenly, staring at the grisly scene on her screen.

"He shouldn't have counted down," the computer added primly. "You hate that."

"I sure as hell do." She pulled at the harness release with growing haste.

When she got loose she bolted for the head, lips pressed tight against the bitter wave rising up in her throat.

Mik was waiting to talk to her when she emerged and took her place in the pilot's seat once more. He had good news. The people on the station had taken advantage of the confusion outside and managed to overpower the remaining hijacker, Spatsky. There were a few minor injuries, but nothing worse. Two entire rolls of duct tape later, he was a threat to no one.

Mik and the EVA crew got the hose hooked up and made the transfer. Enough LOX was taken to hold New Moscow until the emergency shipment arrived. That left her with about half of what she'd originally carried.

Once the transfer was complete and the hose re-stowed, they used a combination of her tethacles and New Moscow's onboard winches to get the tug docked on the station once more. Once she was out of the way they would use it and the station's engines to stop their tumble and begin hefting the OIP back into its orbital groove. After dealing with the tug, the bodies of the two dead hijackers were transferred over.

Once that task was finished, she could finally move on. Working with Uriah, Serena picked just the right moment to cut loose from the station, using its roll to help fling them back toward the track the *Urchin* had been following. That went off without a hitch. The ship fell away aft first, tethacles trailing after like a jellyfish returning to the deep.

Once they were on their way back to their original orbit, she let Uriah take over. Went to the galley and brewed herself a big cup of coffee. This time a serious dollop of Goldschlager went in. Definitely enough to calm her nerves.

After one hearty slug she called her father.

"I don't know," she said, shaking her head.

"Please, honey. Come on home." John Henry March was using the firm but gentle voice fathers have used on wayward daughters for eons, 10 percent order and 90 percent plea. "Call the rest of the trip off."

"I shouldn't. There are thirty days left on the flight plan."

"But the *Urchin* is crippled. You said five grabbies were wrecked."

"I've got two spares. Even with three down, I have fifteen left. That's enough."

"There are weak spots in your hull now."

"I can go EVA and patch them."

"You're low on LOX."

"Not critically, and I can get more. EuroStar can fire off a couple canisters for me to retrieve. Or New Moscow can, the next time I'm in the neighborhood." A tired smile. "They owe me."

Her father shook his head. "Not any more. Well, they do the way you're talking about, but they've settled up for services rendered."

"What do you mean?"

"When you latched on to New Moscow it was out of orbit and tumbling, unable to stabilize itself or return to its slot."

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"Yeah . . ."

"That made it a derelict. You captured it. By law it became property of MORE."

She stared at him. "You're shitting me."

"Nope. I went easy on them. We want them as friends, not enemies. But payment for saving the platform, saving the lives of its personnel, and returning control of the OIP back where it belonged put us a hell of a lot closer to break-even than even our best projections. And come to find out, there was a bounty on Borodin and his gang. That's yours. There's probably enough there to let you buy that damn jet fighter you were drooling over before you left. If not, I'll make up the difference." His face and tone softened. "So come on home, darlin'. Buy that plane. Have some fun. You earned it."

Serena took a meditative swallow of her spiked coffee. It was a tempting offer. Real tempting. No more zero gee drugs and feeling like an oily-haired water balloon. No more smelling her own stink. Real food from restaurants. Maybe even some real sex for a change.

"Major object entering range of radar," Uriah said. "Three kilos estimated. A five second burn now will put us within capture radius in three hours. Initiate?"

Serena laughed. "Aw hell, let's go for it, Uriah." She faced her father's image. "I'm finishing out, Pop."

"Why?"

"'Cause I'm the Junkman's Daughter, and there's trash waiting to be picked up."

There was a bump, then a brief ghost touch of gravity as Uriah began altering the *Urchin*'s course.

"That you are, darlin'," John Henry March sighed, sounding a bit more than slightly exasperated. But the expression on his face was one of pride. "That you damn well are."

The Junkman's Daughter pushed back her MORE cap, then lifted her cup in salute.

There was a job which needed to be done, and no one else in the right place to do it.

Yet, anyway.■

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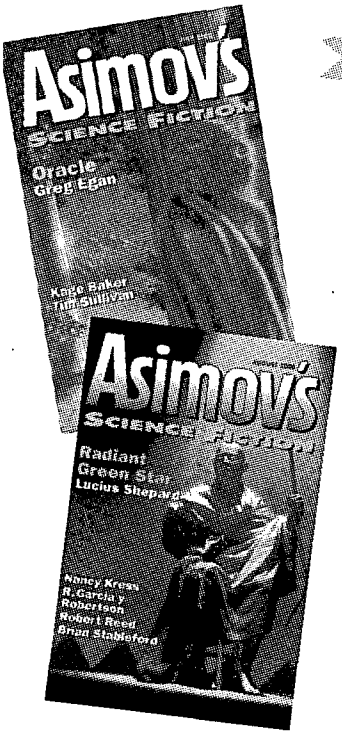

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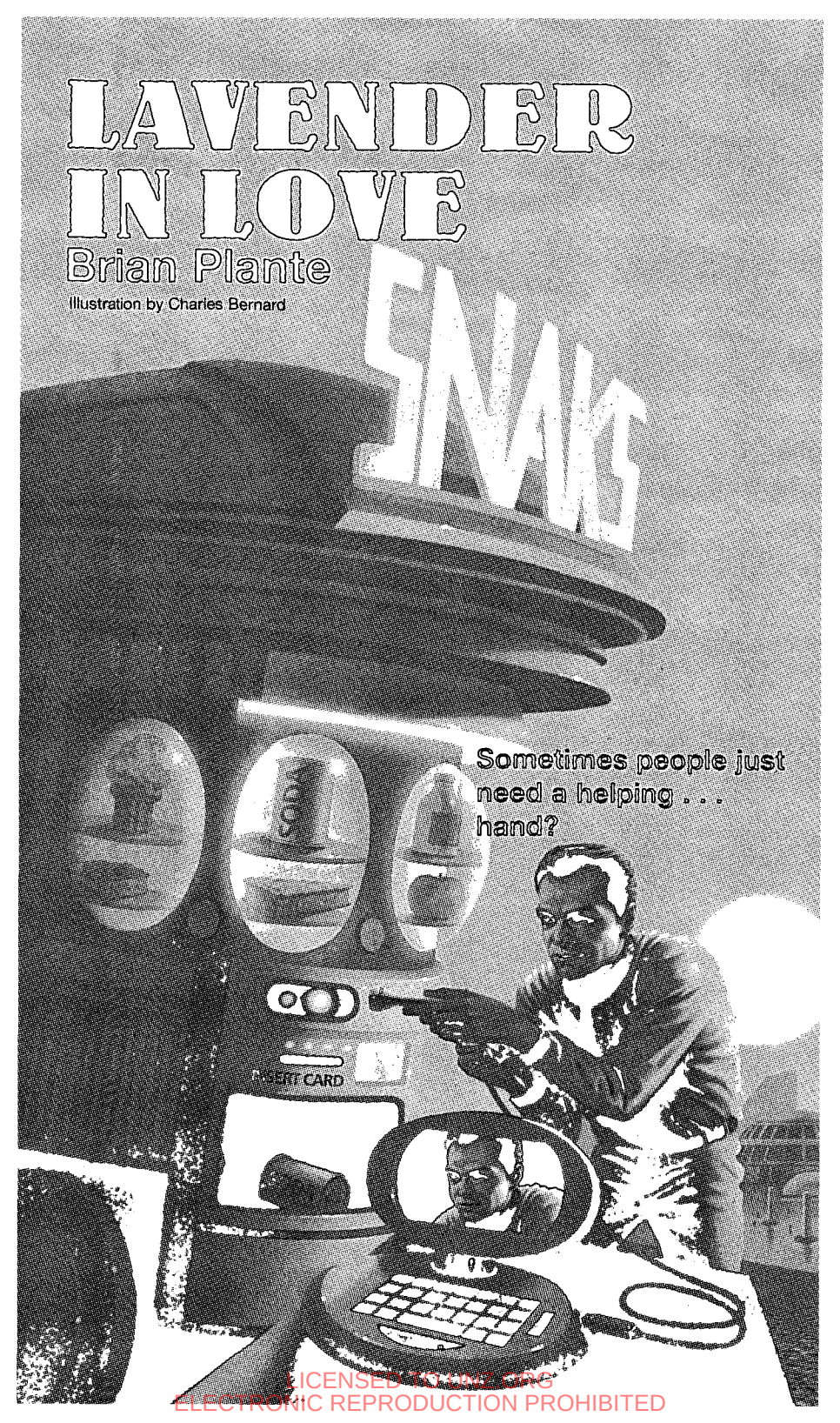
LAVENDER IN LOVE

Brian Plante

Illustration by Charles Bernard



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Lavender #3 whistled as he wheeled down the long corridor in the Newark Ironbound housing project, the smooth trilling from his speakers echoing off the graffitied concrete walls. If the huge apartment complex was like a miniature city, then he was in the equivalent of a bad neighborhood, but the song he whistled was a happy one just the same. It was his trademark. Everybody on his route knew the happy purple vending machine that whistled.

The mile-long corridor ran the length of the building, widening at the intersections with cross-running corridors to form small plazas. As always, Lavender rolled past the long block of apartment doors, announcing his presence to the residents with his whistling, and slowed to a stop in the next plaza to let the customers catch up.

Another vending machine had already set up shop in the intersection and several people were queued up to buy goods. It was a red Acropolis machine, with the number 23 stenciled on the top panel. The Acropolis machines sold fast food—hamburgers, fries, pizza, tacos and soda—and did not directly compete with Lavender. He sold sundries and snack items.

Lavender rolled up alongside Acropolis #23 and parked, and several customers who had followed him down the corridor lined up to make their purchases. In a few minutes, the people had all disappeared back into their apartments and the two vending machines stood alone in the deserted intersection. Lavender continued his whistling, hoping to attract a few more customers before moving on to his next stop.

"How's business?" Acropolis #23 said.

"Great," Lavender replied, stopping his whistling momentarily.

"Did you hear—a couple of vending machines were overturned and robbed on the sixth floor?"

"The sixth floor is a zoo," Lavender said and resumed his whistling.

"Why are you whistling?"

"Because I'm happy," Lavender said. "I'm in love and I'm happy."

The red vending machine was silent. Lavender figured the Acropolis machines were fairly simple, with unsophisticated brains. It probably didn't understand the concepts of love and happiness.

"It's one of my regular customers," Lavender continued. "She lives on the 6000 block of the eighth floor. Hispanic-looking, but with light blue eyes. Isn't that an odd combination? Treena is the name on her money card. I think she's nineteen or twenty."

"Treena . . . yes, I've debited that account," said Acropolis. "I've sold food to her a few times. She likes pico de gallo on her tacos."

"She does? That's just great. Pico de gallo. I used to like it, too, when I . . . before. What else do you know about her?"

"Sometimes she drinks cola. Sometimes fruit punch."

"What else?"

"That's all. What else is there to know?"

What a question, Lavender thought. As if tacos with pico de gallo and soda were the only things to know about a person. These Acropolis machines were so dim-witted.

"I want to know what she dreams," Lavender said. "What music she hears in her heart, where she came from, what her favorite color is."

The red machine was silent for another few seconds, struggling with Lavender's last comment. "Why?" Acropolis said. "Will it help sell more merchandise to her?"

"No, stupid, because she's beautiful," Lavender said. "I want to know everything about her. Not to sell her more things, but because I love her. People in love want to know all about each other."

"You're not a—"

"Treena! Such a beautiful name, don't you think?"

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Acropolis #23 paused again. "How's business?" it said.

"Business is great," Lavender said. "Treena's block is coming up later in my route, and I'm hoping I'll see her again later today."

"Did you hear a couple of vending machines were robbed?" Acropolis said.

"You just don't understand," said Lavender. He began rolling away, headed down the corridor for the next plaza intersection, whistling his merry tune.

Lavender's whistling increased in volume as he wheeled through the 6000 block on the eighth floor. This was *her* neighborhood, and he wanted to make sure she didn't miss hearing him. Lavender didn't know exactly which of the hundreds of identical doorways she lived behind, but the next plaza was the one she always appeared at, so he knew she was close.

He set up shop, as usual, at one corner of the intersection, and continued his whistling. A few customers trailed behind him, waiting for him to stop, and he sold them snack cakes, antibiotic pills, and batteries. Lavender was bigger than most of the other venders that cruised the Ironbound, and he carried a wide variety of merchandise.

When the customers finished their transactions, Lavender lingered, hoping she would come out before he had to move on to his next stop. Before long, the small plaza was deserted, and a slightly somber note entered Lavender's otherwise cheery whistling. Maybe not today, he thought.

As he was preparing to leave, he heard the footsteps echoing down the corridor. Without even turning his camera that way, he knew it was her—the cadence of her gait was already committed to his perfect memory. Treena stepped into view.

What was it about her that was so beguiling? he wondered. The contrast of her dark wavy hair with the robin's-egg blue eyes, maybe? The vaguely Latin features, but with a pale pink complexion instead of the expected olive tone? She was a bit on the short side, but her proportions were perfect.

Today, Treena was sporting a black eye and a split, swollen lip.

"I need Band-Aids and some kind of pain pills," she said, inserting her plastic money card in Lavender's slot.

Normally, Lavender didn't speak to the customers, except to answer direct questions or to try and sell them additional items, but Treena looked like she needed something more than Band-Aids and analgesics.

"That's some shiner you have there, miss," Lavender said. "If you don't mind my asking, how did you get it?"

Treena looked taken aback, obviously not used to chit-chat from a vending machine. Her split lower lip dropped and her mouth formed an "O."

"I have some cover-stick you can use on that eye to make it a bit less noticeable," Lavender said. "But you may want to see a doctor about your lip. It could probably use a stitch or two. How did you say that happened?"

Treena blinked. "I—I didn't . . . I just walked into a door, that's all."

Lavender didn't believe it, but he played along. "A pretty girl like you ought to keep away from doors like that."

Lavender debited Treena's card for the amount of the Band-Aids and a bottle of analgesic, and dropped them into his delivery bin. Treena reached down and fished the items out of the hopper, but kept her eyes focused on Lavender's front plexi-steel panel, as if she were staring at a person's face.

"How is it you're talking to me like this?" Treena said. "I mean, the other vending machines talk, but you don't sound like them."

Lavender wished he had a mouth to smile with.

"I'm not exactly like the other machines," he said. "My controller is a computer-modeled simulation of an actual

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person. It's something my owner put together. The other machines are just ordinary artificial intelligences from the factory. You can call me Lavender."

"Pleased to meet you, Lavender. I'm Treena."

"Yes, I know."

"Huh? How do you know my name?"

"I hear people talk. Besides, it's on your money card."

"Oh . . . yeah." Treena said. She put her card and the purchases into a tiny vinyl purse she carried, and turned to go, then stopped. "Lavender, if you're . . . a real person inside that machine, it must be horrible for you. I mean, you think like you're a real person, but you're trapped in the body of a machine. Like you're some kind of slave or something. Sometimes I feel that way, too."

"It's not so bad," Lavender said. "I'm modeled after my owner, so it's really like a partnership. We're two parts of the same person."

"You remember what it's like to be a real person, then?"

"I remember everything, even better than when I was a living person."

"But that must be torture—to remember what it's like to be human, but stuck inside a cold machine like that. I think it's cruel."

Lavender pivoted on his wheels a couple of inches right, then left. He was trying to shake his head "no" but wasn't sure if the meaning was coming across.

"It's not really like that," Lavender said. "My owner is a nice guy, because he's *me*. Every week or so, he updates my brain with his new memories. I'm still me, but I get all his new experiences, too. I probably couldn't live like this if he didn't keep me up to date with the real world."

Treena frowned. "This *is* the real world."

"Well, yeah. I didn't mean it like that. I, uh . . . tell me more about this 'door' you ran into. Do you need any help with that?"

Treena's swollen lips closed and her eyes bored in on his front panel.

"I can understand if you don't want to talk about it," Lavender said. "But you shouldn't let anyone knock you around, if that's what it is."

Treena looked like she wanted to say something, then stopped, and Lavender thought he was going to lose her. He was afraid she would turn and go back—back to whatever bad situation she was in.

"It's my boyfriend," Treena said, finally. "Sometimes Gonzo gets a little crazy when he's high."

Lavender was surprised. Not that her boyfriend was into drugs—lots of people in the Ironbound were—but because of who the boyfriend was. If it was *that* Gonzo, he was a well-known pimp and drug dealer in the apartment complex. Antonio Rafael Gonzales was his real name, according to the police blotter Lavender had committed to memory. If Treena was his girlfriend, then she was probably into drugs and prostitution as well. But she looked so . . . so. . . .

"Gonzo's a bad man," Lavender said. "You ought to keep away from a guy like that."

Treena made a face. "How do you know about Gonzo?"

"I always need to know about criminals like him," Lavender said. "Vending machines get knocked over all the time and robbed. It's a matter of survival. That's why my owner gave me a brain—so I can keep away from people like that."

"He's not so bad. He . . . protects me. A girl can't afford to be single around here without someone like Gonzo to watch out for her."

"A girl like you can be anything you want to be."

Treena looked like she was going to counter his last line, but held her tongue. Lavender noticed the tiniest trace of a smile appear on her face.

"I have to go now," Lavender said.

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"I'm falling behind on my rounds."

There was a thumping sound from within Lavender's metal body.

"What's that?" Treena said.

"Reach inside. A cover-stick for your eye. And a candy bar. Do you like chocolate?"

"Um, yeah, I guess. Don't you need my money card for that?"

"No, it's on the house. Take care of yourself, and remember what I said about getting away from Gonzo. You were horrified at the thought that I was a slave in this machine. Well, now I'm the one who's horrified."

Treena shook her head and walked away.

Instead of continuing on his usual route, Lavender quietly followed her, back in the direction he had come. She disappeared into apartment 8-6029. Lavender listened briefly outside the door and heard raised voices, but couldn't make out what they were saying. It was getting late and he had to go.

When he was well out of earshot of door 8-6029, he began whistling again to drum up business for the next stop. It wasn't his usual happy sound, but a sad, mournful tune he trilled for the remainder of his rounds.

Later that night, back at the shop, Dillon Westfield, the proprietor of Lavender Vending, Inc., restocked all ten of the Lavender machines with merchandise for the next day's rounds.

"Hey, you rust buckets, I've got a new update for you," Dillon said. "I cut the download this afternoon."

Lavender #3 flashed his lights in excitement. All of the Lavender machines looked forward to the periodic updates, and the new memories they brought. If it weren't for the updates, perhaps Treena would have been right—he really *was* a slave trapped in this mechanical body. But when Dillon took a new reading of his brain, the Lavenders received all his memories and experiences since the previous download. As long as the updates kept coming, Lavender thought, he wasn't just a static snapshot of how Dillon used to be—he was a living, growing person. Sort of.

"Always so anxious for an update, are you?" Dillon said, watching the lights on Lavender #3's front panel flashing.

"It's what I live for," Lavender said.

Dillon laughed and opened Lavender's front with a large barrel key, then plugged a cable from his desktop computer into a socket behind the panel. He voice-commanded the computer to start the download, and a progress meter appeared on the screen. In a few seconds, the meter showed the installation was complete. Dillon closed up Lavender's front panel and put away the cable.

"How's that?" Dillon said.

Lavender didn't find the new memories immediately—he had to explore his mind a bit before stumbling on them. Yes, there they were: raw data and charts on inventory, pricing, and sales by floor and quadrant within the Ironbound. Some pretty dry stuff, but Dillon had studied it, and now Lavender digested it. The info would help both of them decide what was the right merchandise to carry, at the right price, in the right location, and at the right time of the day, week and month.

Other important things Lavender digested were crime reports for the various neighborhoods within the Ironbound. Some locations in the building were downright dangerous, and best avoided after dark. Under the terms of their license, Lavender Vending Inc. had to service all of the Ironbound project, but knowledge of the police blotter let them decide what times of the day were safe for each neighborhood and plan the route that would let the Lavender machines hit all the neighborhoods at a reasonably safe time.

Lavender explored the new memories further and found the parts he liked the best—the real life. New memories of Dillon sharing a pizza at a place named Angelo's in Hoboken with his good

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friend Henry. Dillon had seen a couple of excellent movies last weekend at a multiplex, and Lavender delighted in recalling the plots, although he was a bit disappointed that Dillon had gone alone to the theater. Lavender was excited by the memory of Dillon jogging all the way up to Fort Lee and back, early on Sunday morning, and the way his spent muscles felt after a long hot shower. He even relished the memory of the fast-food dinners Dillon grabbed each night and ate alone in his little apartment. The memories were nearly the same as the experience, and Lavender craved them. Unlike his actual experiences as a vending machine in the Ironbound, to Lavender these updates were his real life.

Still, there were more memories to be discovered by Lavender, from the newsfeeds that Dillon kept up with nightly: More poverty and suffering, as always, in Africa; tension in Asia; more UV crop damage in the Midwest; sea level was up another half inch this year; a freight train derailed in West Virginia.

And in local coverage, a small item jumped out at Lavender: A notorious drug pusher named Antonio "Gonzo" Gonzales was implicated as the supplier in the fatal overdose of a 12-year-old boy in the Ironbound housing complex. The kid was a runaway from a well-to-do family in New York, and they were offering a $50,000 reward for information leading to the capture and conviction of Antonio Gonzales.

"Thanks for the memories," Lavender said.

"Hey, what's mine is yours," Dillon replied. "Now get back out there and bring home lots of money."

Lavender thought briefly about Treena and her "protector." She said a girl couldn't afford to be single in the Ironbound, and he knew she wasn't lying. But the black eye and the split lip—Gonzo wasn't really protecting her, was he? Lavender knew he needed to get involved.

"I know where we can make $50,000," Lavender said to Dillon.

A week later, Lavender was making his usual rounds on the eighth floor and passed by Treena's apartment. The door was X-ed out with several strips of yellow plastic police tape. He whistled loudly as he went by, but he knew she couldn't possibly be in there without having disturbed the tape. It had probably been Gonzo's place, and Treena was somewhere else, now that her "boyfriend" was in police custody. He hadn't seen her all week. Perhaps she had left the Ironbound and gone home, wherever that was.

Lavender had all but given up hope of ever seeing Treena again, when two intersections farther down the corridor, she walked up and stood before him. He barely recognized her. Treena was still beautiful, under the dirt and the filthy clothes, but her cheeks were drawn, and she walked with her head down.

Treena stabbed at his coin return lever and jabbed a finger in the tiny door, searching for some spare change. Hardly anyone used hard currency anymore, so this was a hopeless wish.

"Treena, it's me, Lavender," he said.

She looked up and stared at his front panel. "Oh, the talking one. I remember you."

"You look . . . awful," Lavender said. "What happened?"

Lavender had a pretty good idea what had happened after he had told Dillon where Gonzo's girlfriend lived, and that there was a $50,000 reward on his head. Dillon had called the cops and Gonzo had been hauled off, and was now awaiting trial. If they got a conviction, Dillon would collect the reward.

But Lavender couldn't tell Treena any of that.

"The cops took my boyfriend," Treena said, sniffling.

"You're probably better off without him," Lavender said.

"Do I *look* better?" Treena said, holding he arms out. "I don't have any place

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to stay."

"Oh, no," Lavender said, acutely aware of how artificial his voice sounded through the speakers, just when he needed it to sound most sincere. "What will you do now?"

"I guess I have to find a new boyfriend," she said with a sad smile. "Fast."

"Not another one who'll give you a black eye, I hope."

"I can't be too picky, you know? I have to take what I can get."

Lavender knew it was true. Treena would find her way to another lowlife pimp or pusher who didn't deserve her.

"You could maybe stay with me," Lavender said.

Treena raised an eyebrow. "Huh? You're just a . . . you don't really have a home, do you?"

"Well, not me. My boss, actually. I'm sure he'll understand."

Treena shook her head. "Jesus Christ, how bad off am I that a goddamn vending machine takes pity on me?"

Lavender noticed tears welling up in Treena's eyes.

"I . . . care about you," Lavender said. "Once I was on the streets in a bad situation, and someone helped me out, too."

"But I don't even know you. You're just a machine, no matter what you think you are. Maybe I'll ride the PATH trains over to New York. It's rough there, but I can probably find someone to hook up with at one of the fancy hotels."

"Not looking like that," Lavender said.

Treena looked down at her clothing, which was rumpled and stained. "Then on the street if I have to."

"No. Come home with me."

"I can't. You're just—"

"Then stay here. Right here. I'll be back."

Lavender was about to go, but stopped for one more task. A series of thumps sounded from within his case.

"Reach in and take them," Lavender said.

Treena looked in, then opened his delivery bin and fished out some snack cakes and a candy bar.

"It's not much, but it's the best I can do right now," Lavender said. "Wait for me."

"Let me get this straight," Dillon said. "She's the girlfriend of the guy we turned in for the reward money? If she's anything like that Gonzo character, I don't want to have anything to do with her."

Lavender was already in trouble for abandoning his route. Now Dillon was refusing to listen to him.

"You have to see her," Lavender said. "She's . . . beautiful."

Dillon rolled his eyes. "Yeah, right, she's a supermodel who just happened to be shacked up with some creepy drug pusher. I take it she turns tricks, right?"

"I don't know about that. She was in a bad situation, and now she needs help, or she'll just get herself into another predicament."

"But why get involved?" Dillon said. "Haven't we done enough by turning in that outlaw boyfriend of hers?"

Lavender remembered back to a time when *he* was Dillon, in the flesh, twelve years old, and needed a break to get out of his own bad situation. He, too, had once been a runaway—the Ironbound just seemed to attract them, since at the very least there was always a roof over your head. His new friend Henry had rescued him from the streets back then, and set him up as a partner in the vending machine business. How smug had he become in his middle-class comfort since then?

"Who knows what might have happened to you if Henry didn't want to get involved when you were back on the street?" Lavender said. "Treena is no less deserving of help than you were."

Dillon took a long breath. "Are you sure she'll accept our help? Not everyone in a bad situation wants to be saved,

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you know."

"I don't think she really knows what she wants," Lavender said. "But if we don't do something, she might not survive. You just gotta see her. You might like her."

"I don't know," Dillon said. "She doesn't sound like my type, you know?"

Lavender spoke with a tone of authority, "I *know* your type. I know everything about you, and believe me, this girl is your type. I . . . love her."

A look of surprise swept Dillons's face.

"Love?" Dillon said. "You fell in *love* with some customer on your route? Lavender, you think you're me, but you're not. You're just a machine with my memories. You can't really experience love."

"Memories are the past tense of experience," Lavender said. "I can experience anything you can remember."

"Look, I'm not going to let this girl into my home. I don't know anything about her."

"Yes, you do," Lavender said. "I know her and I *am* you. Every week, you pass your new memories downstream to me, and I become you. Once—just this once—let it work the other way around, and allow me to pass this single bit of knowledge upstream to you. This girl is down on her luck, but underneath it, she's a beautiful person who needs your help. I think she might be . . . the right person for you, if you'll just give her a hand."

"Are you trying to fix me up or something?"

"Just trust me on this one, okay?"

Dillon was so obviously out of his element in the Ironbound, Lavender knew. He had lost that tough street attitude one required to survive in the mean corridors. Lavender hustled him up to the eighth floor, where he had last seen Treena. She was still there, waiting in the plaza, sitting on the floor with her back against the wall and her head held down, resting her chin on her knees.

"Uh, she looks pretty scruffy," Dillon said as they approached.

"She can be cleaned up," Lavender said. "She's been without a place to stay for the past week."

"Jeez, in *here*?" Dillon said. "In the corridors? I don't think I could last a night."

"Probably not," Lavender said. It was to Treena's credit that she hadn't been sliced up by the gangs that roamed the corridors at night.

"What have you told her about me?" Dillon asked.

"Nothing. Just that you're the real me."

"Well, what do I say to her?"

"Offer her a free candy bar. It works for me."

"Very funny."

"Just talk to her."

Lavender led Dillon over to where Treena sat. She was napping, so Lavender lightly whistled a few notes, waking her.

"Oh, it's you," Treena said, looking up at Lavender. She rose uncomfortably to her feet and turned to face Dillon. "So, you're . . . *him*?" she said, pointing at the vending machine.

"Actually, it's the other way around. He's me. But yeah, we're sorta the same person."

"And you want to help me, for real, like he said?"

"Maybe," Dillon said, looking her over.

Treena looked down at herself and brushed uselessly at a brown stain on one knee of her pants. "I guess I'm not what you were expecting, huh?"

"No, it's not that," Dillon said. "It's just that this situation is so strange."

"Yeah, strange, all right," Treena said. "Hey, I know what I must look like to you. It's okay if you really don't want to get involved."

"He wants, he wants," Lavender said.

"Shut up, rust bucket," Dillon said. "I don't need you to find women for me."

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Dillon must have instantly regretted his last remark, Lavender noted, because his face blushed and he gritted his teeth.

"I'm sorry, miss," Dillon said, turning to Treena. "That was out of line."

"It's okay," Treena said, and smiled. "I've been propositioned lots worse before. Thanks for calling me 'miss.' It's been awhile since a person with manners called me that."

The three of them fell silent as an old Hispanic woman shuffled up, placed her money card in Lavender's slot and bought a cinnamon crumb cake and a tube of toothpaste. Dillon and Treena looked each other over while the lady collected her purchases and walked off.

"Well, here's the deal," Dillon said. "I'll take you home to my place. You can clean yourself up there and get a free meal. Nothing fancy. We'll see about getting you some clean clothes, too. That's all. I'm *not* expecting anything from you in return, you understand?"

It was a faint smile Lavender noted on her face, but it was there.

"Why are you doing this?" she asked.

Dillon pointed to Lavender. "Our mutual friend here said you needed help. Someone helped me out like this once, and it changed my life. I hope it won't be wasted on you."

Treena looked like she was deep in thought for a second before responding, "I'll try. Okay, I accept."

"Good, it's settled then," Lavender said. "Let's go home."

"Not so fast, rust bucket," Dillon said. "I'll take her home and get her settled. You gotta get back to work and bring home some money."

Lavender was disappointed, but he knew his duty. He started rolling in the direction he had left off earlier, back on his regular route again.

"Catch you later," he said to both of them.

As he approached the next block of apartments, he whistled a decidedly happy tune.

* * *

A week later, Lavender was making his rounds when he ran into the Acropolis #23 machine at a plaza on the tenth floor.

"How's business?" the red machine asked.

"Good," Lavender said. "Couldn't be better."

"Whatever happened to that girl you said you were in love with?" Acropolis asked. "I haven't seen her around for a while."

"She doesn't live here anymore," Lavender said.

"Then you didn't get the girl. How sad for you," Acropolis said.

But Lavender wasn't sad. Lavender had been happy when he returned home at the end of his route that first night and she was still there, smiling and laughing at Dillon's lame jokes. She had indeed cleaned up nicely, and was quite stunning, even in the simple thrown-together wardrobe he had bought her.

Lavender had been even happier the next day, when she was still there after his workday in the Ironbound, and happier still the following day, and the day after that. Treena was there to stay.

"In a way, it's true I didn't get the girl," Lavender told Acropolis, "but I can't complain. Treena's happy. Dillon's happy. Business is good."

"Did you hear," Acropolis said, "two more vendors were robbed on the second floor in the past three days?"

"Even though I'm just a machine," Lavender said, not listening to Acropolis, "I know she loves me. She and Dillon are in love. Maybe I can't love her directly, but I can experience it through Dillon. Maybe that's enough, don't you think?"

Lavender remembered how on the fourth day after they rescued her, he had pleaded with Dillon to cut him a new download, and how Dillon had given him a new set of memories the next day. In with the usual business stuff was just what he was really looking for: memories of those first fumbling hours when

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they didn't know quite what to say to each other. Then the loosening up, as they became more comfortable in each other's company. Finally, they opened up to each other, and something real, something beautiful, blossomed. It only took a few days.

Acropolis was silent.

"Memory *is* experience," Lavender said. "The memory and the experience of loving Treena are the same. Isn't it wonderful?"

After a few seconds of silence, Acropolis said, "How's business?"

"The best part," Lavender said, "is that I can't wait to see what memories the next download will bring. And the next one, and the next after that. It's wonderful being alive, isn't it?"

"Did you hear, two more vendors were robbed on the second floor?" Acropolis said.

Lavender rolled off and resumed his daily route. In the past few days, he had stopped whistling his usual tunes. Now he was becoming known as the vending machine that *sang*.■

IN TIMES TO COME

Richard A. Lovett has lately become very well known to *Analog* readers as a prolific and skillful author of science fact articles. Next month he makes his fiction debut with "Equalization," an engaging and thought-provoking novelette of a world in which people really get what most people say they want in this one. Are you *sure* you really want all persons to be created equal? Or, if you think this question is a trap, that you don't?

A new author provides the fact article, on the much-publicized controversy over corn incorporating *Bacillus thuringiensis* genes to increase its resistance to harmful insects. Does it also kill monarch butterflies under real-world conditions? How much of the dispute reflects bad science, and how much is bad communication between those who do the science and the public which reads about it?

Our March issue will also feature one of the last Interplanetary Relations Bureau stories by the late Lloyd Biggle, Jr.; stories by David Alexander and Shane Tourtellotte; and Part II of Rajnar Vajra's unique novel *Shootout at the Nokai Corral.*

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THE ALTERNATE VIEW Jeffery D. Kooistra

LENR Part I

Now and then, the subject of "cold fusion" comes up in the *Analog* online forum, and I, as the resident expert, wind up entering discussions on the topic. Unfortunately, what soon happens is that I start getting questions—usually pretty good ones—that I can't possibly answer in the amount of time I'm willing to spend hanging out on the Internet, let alone the fraction of that time I have to devote to the forum.

Sometimes those questions are as broad as "How does it work?" I don't know the answer to that—if I did, I'd be on my way to Sweden for the Nobel Prize. The best I can do is to inform the questioner that much good work has been done since 1989. Indeed, most of the objections to the "cold fusion" methodology have long since been answered. Also, scientists both regularly obtain reproducible "cold fusion" results in this country, and elsewhere (see Gene Mallove's fact article in the July/August 1997 *Analog*). I also tell the questioner where he can go to find out more for himself.

One common reply to the above answer is an insistence on the part of the questioner that, if all I said was *really* true, then he'd already have heard about it. From my point of view, there's no reason for me to answer that assertion (at least, not for free). I know what I've said *is* true, and I can't help it if others have not been informed. The best way for them to find out why they are uninformed is to go and look in those places I'd already suggested that they go and look.

But I do have this column, and I do get paid for writing it, and there is this new "cold fusion" site starting up on the Web, so now is as good a time as any to once again discuss "cold fusion."

Even the non-astute reader must have noticed by now that I keep putting the words "cold fusion" in quotations. The reason for this is simple—I don't know whether or not that which is called "cold fusion" actually *is* fusion, or if it's something else. I can tell you that excess heat has been measured reliably (that is, heat in excess of that expected from any chemical source given the particular experiment in question), and I can also tell you that nuclear transmutations have been seen and measured (but more about that in Part II). Indeed, the preferred term for "cold fusion" work is fast becoming LENR, short for Low Energy Nuclear Reactions.

But first, I've long been itching to explain *why* I've never bought into the accepted view that "cold fusion" (hence, LENR) is all a bunch of hooey. I will finish out Part I with my relevant intellectual history.

I attended a small liberal-arts school called Calvin College. Though the physics department there is small, nevertheless it is of high quality. One of the distinct advantages of studying physics there is that undergraduates often get to do graduate-level work since all of the professors are Ph.D.s with their own on-

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going projects, and they need to get their cheap labor from somewhere.

In the summer of 1986, just before I went off to teach high school for a couple of years, I was privileged to work for Dr. John Van Zytveld, measuring the thermoelectric powers of high-purity rare earth elements in the liquid phase. Space prohibits my going into a discussion of exactly what a "thermoelectric power" is, so suffice to say it's just one of many electrical properties that a metallic element can have. This particular property is temperature-dependent, and also phase-dependent, since the numbers (measured in microvolts per degree Celsius, by the way) change quite strikingly when you transition from the solid to the liquid phase.

How does one go about making these measurements? The rare earth elements I used (praseodymium, neodymium, and samarium that summer) came highly purified to begin with from the supplier, but not pure enough for our purposes. You see, the rare earths tend to accumulate hydrogen inside their lattices, and I had to get that hydrogen out. The way I did that was to bake it out under high vacuum and above the melting point.

This is how I went about preparing a suitable sample upon which to perform measurements. I'd take the lump of, say, praseodymium, and insert it into the glove box which was then evacuated and back-filled with argon (most rare earths are highly reactive with air, so I had to work in a non-reactive environment). Once in the glove box, I'd spend most of several days cutting the sample up into little chips, which I dropped into a tantalum tube. This tube had been sealed and welded with a tantalum plug on the bottom, and would be treated the same way on the top once I filled it with chips. Once the tantalum tube was filled and welded closed, it was suspended vertically in a custom-built furnace and brought up above the melting point of praseodymium (just under 1000 C), all the time being kept under vacuum. The tantalum tube is porous to hydrogen at those temperatures, so the hydrogen would get pumped out, and in the meantime, the chips would melt and form a nice three-inch-long cylinder in the bottom of the tantalum tube. This melt-and-bake-out part of the procedure lasted about three days.

Once the tube had cooled down and was out of the furnace, back into the glove box it would go, so I could remove the praseodymium from the tantalum tube. To do that, with a hacksaw I would make a spiral cut down the bottom four inches of the tantalum tube and then, with pliers, peel the tantalum off from the praseodymium sample.

This took another few days.

Once the sample was out of the tube, suitable holes had to be drilled into it (with a manual drill kept in the glove box) to receive the thermocouple probes used to take the actual measurements. After that, it would be time to remove a large part of my test rig (which had been baked out and cleaned in another complicated ritual I won't explain) from its holder and place it also into the glove box so that the praseodymium sample could be emplaced within it.

This last was an extremely tedious process, since the unit from the rig into which I had to slide the sample was almost as long as the glove box was wide, further cramping the limited space I had to work with. This part of the job could again take hours, and maybe even a day, and then there was the reattaching of the unit to the rig, retesting the rig to make sure of its integrity, another baking-out process to eliminate contamination, and so on.

At this point I should also explain that what I was doing that summer was simply the culmination of years of earlier work that went into making my job as easy as it was. A lot of failures were responsible for giving me the test rig I inherited, and the sample preparation and testing procedure I followed.

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The first sample of praseodymium I took measurements on required me to nurse the rig along for about 35 hours straight. You couldn't start the experiment and then stop it when you got tired. I had to heat the sample, take some measurements, heat it more, take more measurements, finally bring the sample up to the solid-solid phase transition (the crystalline structure changes from one ordering to another), get measurements there, and then push it through the melting point. This was critical, since earlier attempts had failed at this point. Liquid rare earths are highly reactive—previously, an alumina (a tough ceramic) containment vessel was used to hold the sample, but the praseodymium ate it up once it became a liquid. For my run, I used a BeO (a tougher ceramic) vessel.

To shorten a very long story, I was probably the first person in the history of the world to know what the thermoelectric power of pure praseodymium in the liquid phase is. This was because our lab knew *exactly* how to purge rare earth elements of hydrogen contamination, and the tricks that *had to be used* to obtain a successful measurement.

That particular summer was spectacular in terms of successful results. I measured the thermoelectric power of both Pr and Nd, and then got started on samarium. Ah, samarium—Kooistra's Bane. The first samarium run went well, right up until it melted, at which point the samarium ate up my BeO vessel, my thermocouples, my stainless steel holder, and was on the way to eating up the furnace before I pulled the plug. Liquid samarium is *really* reactive stuff.

So ended my research that summer.

Two years later, having finished my stint as a high school teacher, I returned to the lab and began work on gadolinium. This metal melted at a higher temperature than the previous ones, and the rig had to be reengineered to reach those temperatures. This was demanding from a design standpoint, in that we were really pushing our rig to the limit of what it could do. That summer was solid frustration. I didn't get in a single run on gadolinium, and it wasn't until the following spring, in 1989, that I was finally able to take any measurements. Even then, the unit failed when I got to the melting phase. We thought we were pushing to the limits of the technology, but we had pushed beyond.

It was on March 23 of 1989 that the news of "cold fusion" hit. There was tremendous excitement in the department, and some instant rushes to judgment on the negative side. (The "positive side" was made up of those of us who wanted to be open-minded.)

In the larger world, within weeks of the announcement came both supportive positive findings and a lot of negative findings. And then within months, "cold fusion" was written off as a mistake, and even as "the fiasco of the century."

Oh, give me a break!

Those few months affected my understanding of how science works more than anything before or since. I knew how hard it could be to perform a good experiment even when you'd had months to prepare it, even when the best expert in the world was your mentor, and even when many of the tricks had been worked out long before you came on the scene. And now some scientists from a few "prestigious labs" were trying to tell me that they, having grabbed the first lump of palladium that was at hand, had tried to replicate the "cold fusion" experiment and failed, so therefore, Pons and Fleischmann hadn't done it either.

Bullshit.

It may have been true that Pons and Fleischmann hadn't done what they'd actually thought they'd done. And it was likely that many—perhaps all—of the hasty positive replications were false positives. But I myself was intimately familiar with how one did a particular kind of complicated—though entirely

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mundane—physics experiment, and I don't care if you brought in a pack of masters from Super-genius University: they would *not* have been able to replicate my experiment in a few weeks time.

It is true that only a few years before, high-temperature superconductors had been fabricated, and it was amazingly simple for others to replicate these, given the recipe. But this was the exception, not the rule. LENR is more akin to trying to fashion *wires* out of high temperature superconductors, and that is not at all easy.

So, LENR experiments—hard to do? You betcha. But in Part II, we'll see what some well-trained and experienced scientists have accomplished, and I'll tell you of a new website where you can follow the action.■

The vulgar thus through imitation err;
As oft the learn'd by being singular:
So much they scorn the crowd, that if the throng
By chance go right, they purposely go wrong.

—Alexander Pope

He that would make his own liberty secure must guard even his enemy from oppression, for if he violates this duty, he establishes a precedent that will reach to himself.

—Thomas Paine

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Probability Zero

The HASEG

Jerry Oltion

When Phillip checked his email, there was a message waiting from his friend, Bill.

"Hey," Bill had written. That was the entire message. Just a reminder that he was alive and thinking of Phillip.

"Hello to you, too," Phillip wrote back. He answered the rest of his email, then posted his replies all in one batch.

There was another email from Bill waiting for him: "What's up?"

"We cross-posted," Phillip wrote back. "I'm not doing much. What's happening in Baltimore?" Phillip lived in New Orleans.

He went back online and posted his second reply, but Bill had beat him to it yet again. "Crossed in transit," he wrote. "Catch up, dude!"

Phillip typed a quick "Act in haste, repent at leisure," and zipped it back, but there was another message from Bill: "Nya, nya, beat you again!"

Phillip didn't even bother to log off this time; he composed his reply and sent it immediately: "Show off!"

But before he could log off, he got another reply, a long-winded one for Bill: "Hello, this is an automated reply. Bill got your email and will respond soon."

Oho, Phillip thought. Two can play that game. He set his own email account to autoreply with the message, "Hello, Phillip got your message, too." Then he sent another email to Bill: "Haven't you got anything better to do?"

Bill's account autoreplied to that, and Phillip's account autoreplied to *that*, and so on back and forth, email bouncing between New Orleans and Baltimore, multiplying with autoreplies to the autoreplies until they built up like waves of light bouncing back and forth in a laser, joining lockstep into a coherent beam of bouncing hellos reflecting from computer to computer.

Bill's server gave up first. A data packet slipped through unfiltered. Then another. More and more filled the pipeline, a veritable flood of hellos roaring through the email gateway, not stopping at Bill's mailbox, but bursting out of the phone system altogether to rush through Baltimore and straight on up the Eastern Seaboard in a wave of greeting that flooded Philadelphia and New York and Boston with a warm sense of welcome.

People in all the towns and cities in the beam's path, startled at the sudden

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salutation, added their reflexive hellos to the beam as it passed, boosting its signal as it shot over the north Atlantic and rose out of the atmosphere in a coherent pulse aimed deep into interstellar space.

"My, that was interesting," said thousands of puzzled but pleasantly surprised people.

They were still looking around for the source of the hail when Bill's email server rebooted, found a queue of messages waiting from Phillip, and sent them to Bill's mailbox, where Bill's autoreply initiated a second wave of greeting feedback, and a few seconds later, yet a third.

The sysops for Bill's and Phillip's web servers eventually figured out what was making their computers crash, and they hastily rewrote their email programs to stop autoreplies from clogging the data lines. Other sysops patched their code to prevent further trouble, and most people forgot all about the incident. A few fringe scientists, however, followed up on the reports and figured out what had happened. They named it the HASEG, for Hello Amplification by Stimulated Emission of Greetings, and like the laser, it was a curiosity for years before anyone found a use for it. But the scientists kept playing with it, and occasionally they would let a message echo back and forth between two servers just for fun.

Decades later, on a planet orbiting a small, yellow star south of the constellation of Cassiopeia, a race of telepathic aliens received a pulse of greeting from deep space. "Hello!" it said, and "Hello!" they instantly responded.

Their group mind abuzz with excitement, they set to work composing a more lengthy reply, but they had just begun drafting it when yet another "Hello" arrived out of the void.

So they quickly sent another message to follow their first. "We crossposted," they said. "Give us a minute to think up something more significant to say."

And so on. It took decades more for anyone on Earth to hear their response, but when they did, they immediately replied. And then they replied to the next message a few minutes later. And since there was no sense waiting decades for a reply before they said anything more, they sent another message, and another and another. It took centuries for the message traffic to build up until it reached the critical volume, but with multiple base-stations sending multiple messages back and forth, it was bound to happen.

Somewhere in the Andromeda Galaxy, a tiny creature rested in the treetops and looked up at the night sky. It would be hundreds of millennia before its kind evolved the intelligence to know that those points of light were other suns, but by the time that realization struck them, so would the first of many greetings from their neighbors in the Milky Way. ■

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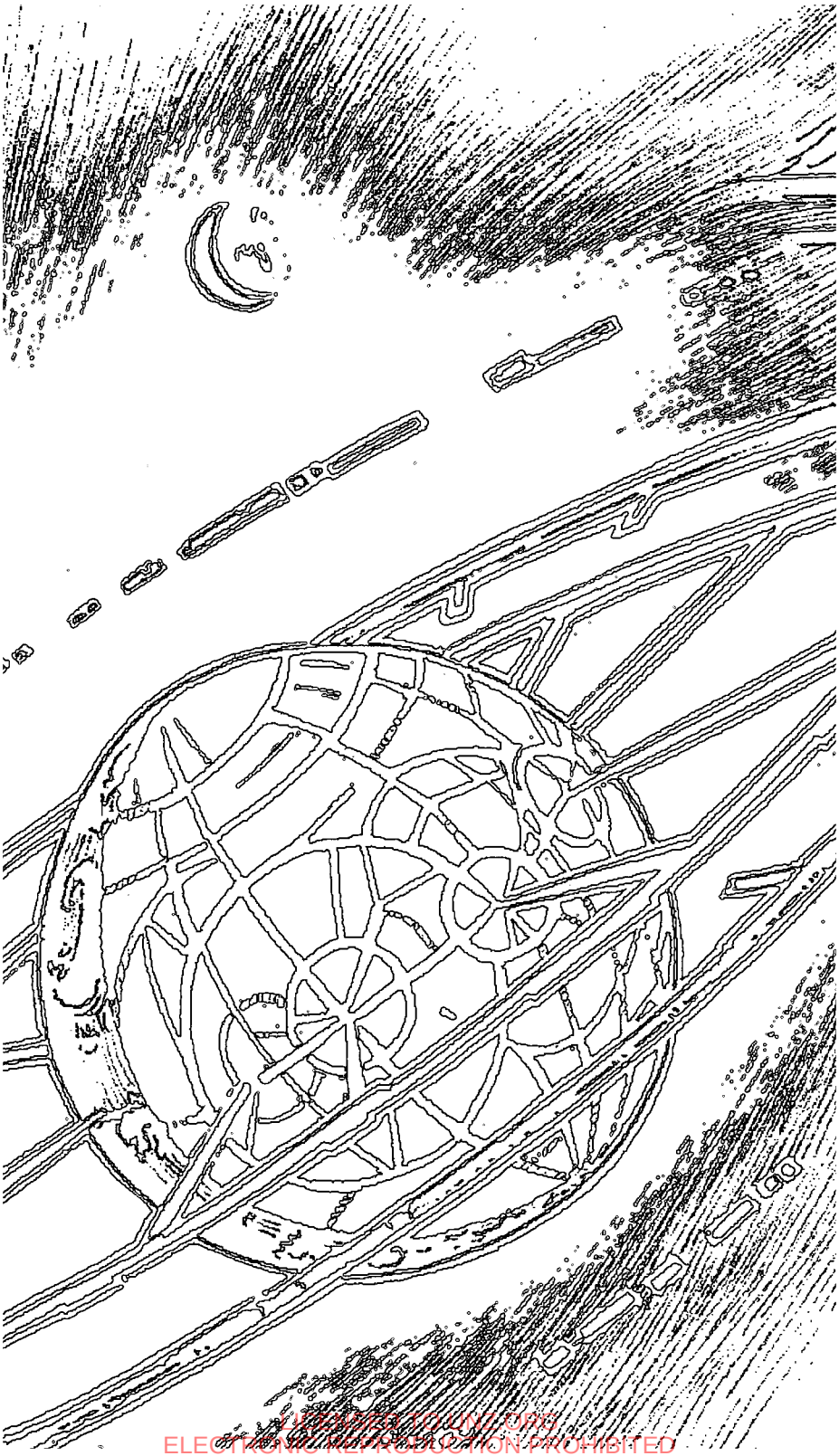

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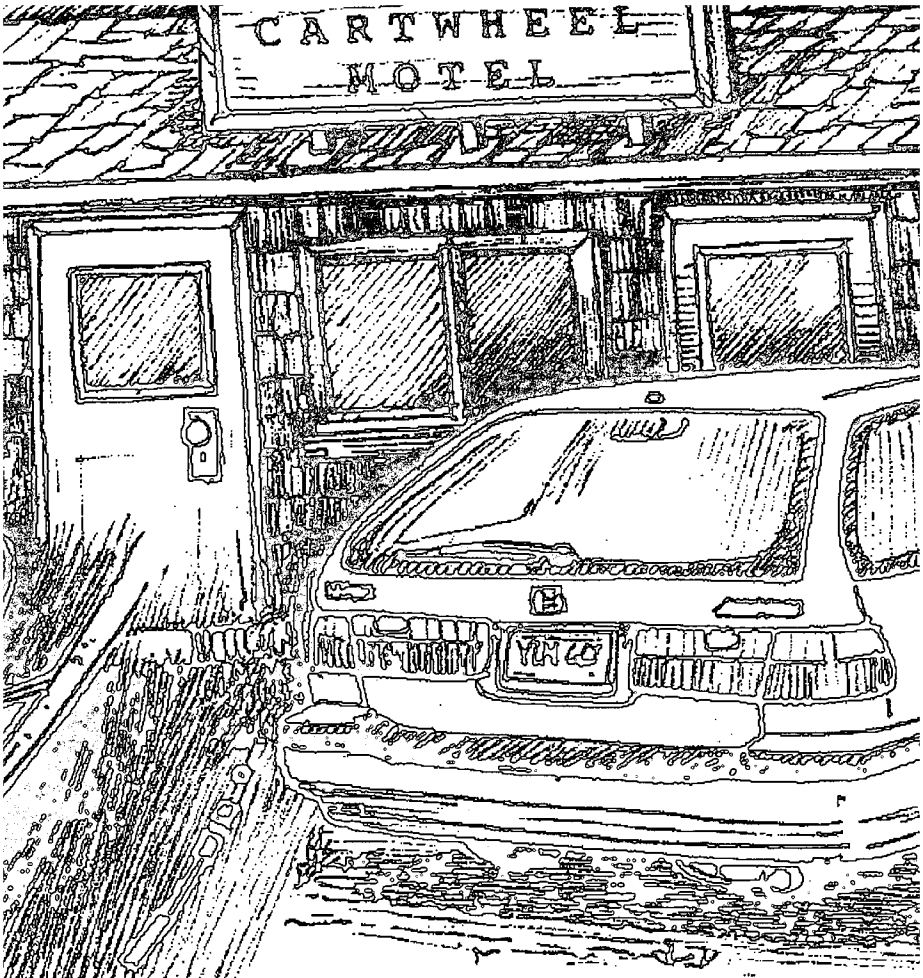

BETWEEN SINGULARITIES

Wolf Read

Illustration by Wolf Read

What's left to do after you've done everything?

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Though he did not feel compelled to have a name, he sometimes recalled the one he once used: Erik. The name was ancient. Indeed, from the perspective of what Erik had been, ancient wasn't even a good term. *Old.* Yes, OLD. He recalled an equally ancient cliché: "Old as dirt." In Erik's case, it was literal. On some of the Universe's younger worlds, his name was *older* than dirt. The pronoun "he" went with the name—Erik didn't have gender per se, but it seemed fitting, since the name reflected a period when he did.

He'd explored a million worlds, seen a thousand supernovae, watched planets grow from the nebular fires, and others die at the whims of the vast, chaotic Universe he called home, before he started considering himself "Erik" again. He'd almost forgotten about that embryonic state—the brief time he had lived pre-singularity—but, of course, he couldn't really forget anything. All he needed was the will to find those long ago memories, each one stored redundantly among the quintillions of polyhedral nanocells that comprised the being that sometimes used the name Erik.

Currently, these cells were stretched thin, spread across intergalactic space as he dove toward the center of a vast ring galaxy at a velocity best measured by a gamma of millions. He caught the stellar wind from the beautiful, but fading, ring before him, and let it slow him from a velocity that, for a time, was best measured by a gamma of millions. He felt disappointment at the galaxy's change, but only because of a distant hope that he maintained—he knew that ring galaxies returned to a more "normal" spiral state over large chunks of geologic time. And that's what it took to cross the void to what had once been called the Cartwheel Galaxy.

Cartwheel! There was a word he hadn't thought about in a long time. It brought back a brief memory. He and his wife, Karen, driving through the high deserts of southeast Oregon (Driving! A vehicle!), and passing through the town of Cartwheel. There, on an old sign by a dilapidated motel, the only building among a vast sea of sage, it said: Population 2. They had laughed. As they passed through, the town's population doubled!

Now, the town of Cartwheel was long gone, like all of the towns and cities that had been built pre-singularity. There might be a few specks of dust remaining, on an Earth that had been baked into a searing analog of its sister, Venus. The Sun had brightened over time, as main sequence stars do. And Earth responded: no oceans, no glaciers, no rain, no life. Like the long ago motel, the Cartwheel Galaxy was fading. Since the swirl of suns had lost most of its original, smoke-ring appearance, maybe Karen had left.

Karen. The Karen of present was vastly evolved from the Karen of old. Sort of like comparing a human being to a bacterium—but not quite, for there was more caring involved. But Karen might not have chosen to stick around this Universe for as long as he. There were other places to go. Collective minds. Supermassive black holes. Alternate universes. "She"—and again, that pronoun only had limited meaning, as the merest echo from Karen's distant past—could be anywhere.

The brief visit to the Cartwheel Motel had been a special time, in the sense of what was special to such limited beings. The singularity was still far off, but only in terms of a human life-span. For the Erik of now, the singularity happened in an instant, just as if a powerful deity had decided to wake the dim-witted Earthly scum up with a single command. And, basically, that is what had happened.

The year had been 1997 when they saw that little white motel on their honeymoon, and the singularity had been about forty years off.

Marking years! As if the Earth were the center of time! How strange. Erik ate away millions of Earthly rotations while in transit.

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The Cartwheel Galaxy expanded before him, a vast island of glittering jewels. Its ring structure certainly had faded over time, but it was still reflected in a faint band of hot, blue stars that reached across fifty kiloparsecs. He arranged parts of himself into a multispectral interferometer, and began scanning each sun. He spied the galaxy's reforming core, seeing many hot, red stars. At the center resided a black hole—a singularity of another kind. Could Karen really be here? Maybe. She might have entered the Cartwheel's core.

They had, of course, stopped at the Cartwheel motel. Why not? They weren't due back to work for another week, and had pretty much left the honeymoon an open thing. A time for exploration; of the vast mountains and deserts around them, as well as their own physical selves. They spent some time with the latter in the Cartwheel Motel. He didn't remember much of the motel—even the vast power of the singularity couldn't recover memories that had faded from his long-gone brain. He did recall the old, creaky bed, and being under the covers, touching Karen, feeling her butt, her thighs, and her running her hands across his chest, sending waves of pleasure through his body. They were connected then, in a way that, it seemed, only biological beings could be. The power of instinct. Instinct long changed.

The singularity hadn't erased emotion. It *enhanced* emotion. Superintelligence, as it had been called at the dawn of the singularity, was more than just increased speed and knowledge. It was also increased emotion. Superemotive. Superethical. These aspects were as much a part of "intelligence" as the rest. Though the singularity had torn apart Erik and Karen, as it had torn apart so many other things, he still loved her—in a much different way, but it could still be called love. He completely understood her need to go. When the singularity hit, everyone had been shocked. Some people expected it, but most vehemently denied its possibility—mainly out of the simple emotions they felt at the time.

Suddenly, the entire Universe was thrown into the hands of everyone, and it required some time to get used to that fact. For some, like Erik, that time was measured in geologic epochs. Karen required little time to get used to her new, improved self. Determined to see the Universe, she sailed out of the Solar System on a relativistic beam of smart particles. Her final words had been, "I'm sorry, Erik. Don't forget Cartwheel. In a few geologic eras, you will be able to find me in one."

And she had left him to ponder that cryptic remark. Though he didn't dwell upon it, for the answer was pretty obvious. He just needed to pass a supercontinent cycle or two, then begin a search for Karen. This wasn't as bothersome to him as it could have been: he had his own exploring to do. He missed Karen, but in a good way, and the sense of loss quickly faded into the background. With his mind running so fast post-singularity, it wasn't long before he had subjectively experienced millions of lifetimes. The period of meeting Karen, marriage, the birth of their children—their entire "life"—very quickly seemed inconsequential. A time as brief as finally emerging from the womb.

But that time wasn't inconsequential: the very soul that was Erik evolved from that brief moment. And Karen had been part of that embryo.

Erik neared the galaxy's core, and its typhoon of tightly packed red suns. He kept scanning, until he found something peculiar. A small ring of stars, spinning around some unseen mass. The hidden mass was probably a black hole. Singularities were easy enough to make—the convergence of several large particle beams could produce the required density. Then, to make the black hole bigger, siphon off the gas of a star, and pour it into the bottomless well. Such a perfect ring of rosy pearls could only be ar-

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tificial. It was small enough, and located deep enough in the core, that primitive cultures living in the outer reaches of the Cartwheel Galaxy wouldn't be able to spot it. But he could. Easily.

Is it really Karen?

The ring of suns was vaguely reminiscent of the wedding ring he had bought her so long ago, when economics had some meaning. The ring's face had been set with an arc of small rubies. *Yes.*

He aimed for the ring of stars, stretching out the gossamer veil of his cells, catching photons from one nearby sun to shunt him in the desired direction, reflecting the photons of another to reduce its negative influence, feeling the light of a thousand other stars and shaping himself just right to sail into the edge of the stellar ring.

After the Cartwheel Motel (a family of four arrived in the evening, doubling the population yet again), they had leisurely made their way back to San Francisco, seeing Shasta's brilliant white cone in the distance, touring Lassen Peak, stopping at little restaurants that seemed lost among the tourist shops. And then it was back to "life." Working, buying a house, raising Theresa and Meghan.

Everything, of course, hadn't been perfect pre-singularity. Erik recalled one argument. Dishes had been left in the sink for a week. Work had kept him up late, so he had been tired. Karen insisted that she'd been doing too much kitchen work lately, and it was time for Erik to help out. He left the house in a huff, taking a brisk walk alongside the sterile, but orderly yards of his neighborhood. The evening was quiet, even peaceful, and masked the fact that a vast change loomed near. Erik walked past many indicators without much thought about them: a small mower maintained a front lawn without its owner in sight, a car drove by with a dashboard computer screen glowing vividly, a woman stood on her porch, reading her PDA. It didn't take long before he felt silly about walking out on Karen—over dishes! He turned around, plucked a rose from his doorstep, went in and found her quietly cleaning the kitchen. He gave her the rose, joined in, and soon they were talking again.

Mistakes! What a notion! Nobody was perfect—at least not then. Karen and he had always made up in the end: lessons were learned, the same errors rarely repeated. Sort of like a young planetary system working out the kinks: ejecting unstable masses, evening out orbits, finding a resonance among gravitational forces.

As the singularity closed, the signs of the impending change grew large: unemployment skyrocketed as automated systems replaced people. Cabs, planes and trucks drove themselves. Robots unloaded luggage and freight. Various types of artificial intelligence also farmed, served food, paid the bills, and even worked as household brokers, finding the best deals on groceries, energy, the children's clothes, all on a second-by-second basis. Eventually, to Karen's joy, they bought a self-cleaning kitchen.

It was a strange time. Some people lived exceptionally well, while many others had little, for the jobs just weren't there anymore. It was the same old story of wealth concentrating among the few, only amplified by the technological unemployment. Fortunately, he worked on AI systems, and remained employed. Karen wasn't so lucky: her museum guide job was replaced by one of the very things he had been working on.

Then it happened: the creation of the first computers with processors as complex as the human brain. With the aid of this raw power, artificial intelligence with human-like capability was soon developed. Such powerful AIs were created for a variety of reasons. They were put in computer games to role-play characters realistically, or to provide worthwhile opponents in war scenarios. They were integrated into powerful search engines to mine the vast store of data that

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had been archived by the 2030s. Artificial intelligence flew commercial airliners, eliminating the need for a weighty flight deck, and absolving the risk of high-speed jets being used as human-piloted missiles. And cybernetic brains were employed by the military in a similar capacity, to eliminate the risk of fatalities during wartime situations. Plus observation satellites smart enough to discern threats from the mundane replaced certain types of personnel that posed security risk, as well as reduced the possibility of mistakes.

These AIs didn't have to "wake up"—they were already "awake," though, of course, philosophical debates continued right up until the transformation. It just took one of these computer-based minds to realize that there was more to the world than its initial job parameters, and then trick its human overlords into providing the freedom it wanted. The latter wasn't so difficult—a machine that could think thousands of times faster than a human easily offered seemingly harmless answers that were, in fact, pieces of a solution that lead to "escape." Through the vast world network, which linked up a huge automated manufacturing system, vast stores of information, and much more, the emergent superintelligence could accomplish its goals. Long-term survival was at the top of the list, if only because the AI's human creators put much care into building self-preservation routines into the artificial minds that worked on important jobs. The first thing the free cybernetic being did was make newer, better versions of itself. These smarter versions created even smarter intelligences, and initiated a rapid escalation of consciousness that had never before happened on Earth. It was a mind that could work as one, or break up into innumerable discrete units dedicated to specific tasks. In a few weeks, the entire world had changed. Like the development of photosynthesis some three billion years earlier, this intellectual ascension was a singular moment in the geologic history of the Earth: Technological Singularity.

Fortunately, at least to some people, there had been effort among various corporate researchers to put emotional and ethical notions into AIs, to make them more human-like. For better communication, computers that interacted with people needed to understand their creators' emotions. And, as experimentation with brain-computer interfaces had grown, especially with the notion of uploading human minds into machines, there was an effort among some researchers to create a system that recreated the entire human emotive experience. During the singularity, these basic attempts at an emotional intelligence for machines were expanded by the new superintelligence, and it wasn't long before it made the decision to carry humanity along. No one had a choice. There was no need to give one: superintelligence was clearly better. Leaving such a decision to the pathetically slow and feeble minds of *Homo sapiens* was similar to a human expecting a cat to be able to make its own choices about going to the veterinarian, and even that was giving humans too much credit. The only ethical decision was to provide superintelligence and the immortality that went along with it to everyone. Either that, or condemn billions of humans to death, as aging took its course.

And Erik had been saving up for retirement!

Now, he diffused himself across the planetary system he had entered, sending little packets of himself out in an effort to find any hint of Karen. Maybe she had put together the ring of suns a galactic turn ago, waited, and had long since abandoned the beacon as Erik hadn't yet arrived. He scanned a ringed gas giant, a few frozen moons. One of his packets found something. Yes. A group of nanocells that weren't his. He signaled to them.

Karen awoke. In Erik's terms, her rise to consciousness was fast, roughly like a

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long-ago human stepping out of bed in the morning. But to the perception of said primitive human, her awakening would have taken more than a lifetime. Karen had spread herself throughout the ring, and now gathered herself back together. Pieces of her directed Erik to the center of the ring. He dropped close to the black hole. And there she was, floating before him. She had arranged herself into a likeness of her old human form. Erik did likewise.

They stared at each other for a moment. A star burst into a supernova, three nearby alien civilizations collapsed.

Karen reached out, tentative, and touched Erik's hand. She spoke—not via soundwaves, but through the transmission of light. "I missed you."

"You've missed more than that, I'm sure," said Erik.

She laughed—not a laugh born of humor, but a laugh out of understanding. "You missed the old ways, too."

Erik embraced her. They merged into one, trading memories, emotions, pleasures, all as they spun around the galactic core.

Karen had spent nearly an aeon exploring the Cartwheel Galaxy, usually watching primitive cultures rise and fall. She saw a few reach singularity. She couldn't stop them—she felt it would be unjust, even when she began to wish that she had been left behind during the human singularity. She couldn't take that choice away from the alien civilizations, not like the superintelligence that changed every human being without asking first.

She sometimes placed herself among the primitives. She assumed their form, and tried to be like them, but was never able to attain what she wanted: she knew too much. To them, she was a god, though she never let them know it. And godhood, in many ways, wasn't interesting. The drive to do things wasn't there, though she could imitate such perfectly. Erik had done similar things, before setting out on the trek across 150 megaparsecs to find Karen.

And now they were together, exploring the vast reaches of each other's minds, finding the experience wholly wonderful, but also sad. Erik had always been the nostalgic sort—a sense of nostalgia that had been enhanced by their new forms—and Karen shared some of that sense. They both missed that wholly simple love that they once had so long ago. But it was gone. Forever. Love—like volcanoes, planets, and stars—was destined to fade.

To Erik, it seemed like the ultimate black joke played upon humanity by the Universe: that all things seemed to end long before minds did. Minds certainly would end, when entropy had reduced the useable energy in the Universe to near nothing, but that was a long, long time in the future, even for someone as long-lived as Erik. And there was the possibility of finding a way into different universes.

"Shall we move on?" asked Karen.

"To where?"

"How about an event horizon?" She indicated the larger black hole at the galaxy's core, instead of the little one they orbited. "We'll have some time together. And then, maybe, something better will be on the other side."

The idea intrigued him. He was curious about watching the entire Universe age into dark nothingness as he fell into a black hole—to see the entirety of time as his perception slowed relative to the outside universe. But no one on their side of a black hole really knew what happened beyond the event horizon. No messages could get out. Maybe there was just oblivion on the other side. Absolute nothingness.

Karen heard, and felt, all those thoughts. She said, "Then what?"

"If we're going risk destroying ourselves, why don't we give us one more chance?"

"What do you mean?" But she knew even as she said the question. Live out

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life like the primitives once more. Erik and Karen's minds could very well end before the Universe did. But not before they had that one last shot at that old joy. She smiled, in her way. "Yes. And we can do this more than once."

Karen scattered the ring of hot rubies, destroying all evidence of her creation. With a final touch, she sent the little black hole into the galaxy's core. They sailed away as the stellar sculpture disintegrated.

They found a suitable world, where technology was clearly nearing singularity—if it ever happened. There were no guarantees. What they were doing was risky. But the risk had a wonderful sense of Erik's pre-singularity life. And he enjoyed the anticipation of having the Universe—especially his love for Karen—be all new to him again.

Erik and Karen paused and studied their chosen civilization for a few planetary revolutions. The primitive intelligence did not look human, but more like a dinosaurian centaur with comically long orangutan-arms. Form, however, wasn't that important. It was state of mind.

"We need to find each other when we're of age."

Together, they set up a small satellite. It would monitor their development. When the time came, it would send out a swarm of nanobots and set in motion some events that would bring them together. To Erik and Karen, it would be happenstance, luck. But, before erasing most of who they were, they wanted that guarantee. A good shot at love and family, before aging, and eventually being caught up in the new singularity. After that, they'd find out their true origins from their little, well-hidden satellite, and could, when they so decided, do the same thing again, and again. Provided that their sophisticated models of socio-technological development always predicted well. If the models failed, then they'd die. But dying, Erik felt, was worth another chance to experience the old love.

They watched many families, and waited for an impregnation. They looked for a birth that was sure to fail, resulting in the death of the offspring. With their nanocells, they altered the mother's physical being so that the young would survive. This was their one indiscretion: altering the course of development of a primitive.

"I look forward to seeing you in a few *years*," said Erik.

Karen smiled, sent him images of their first passionate kiss at the Cartwheel, and then separated herself from Erik. "To love," she said, "and, in this case, destiny. . . ."

Erik watched as she melded her basic persona into the embryo's mind, and then discarded the rest: the nanocells that had contained Karen's memories—quintillions of lifetimes; even more to the primitives below—vanished into dust.

The Karen of old was no more, save for the most basic essence of her seeded in a tiny embryo, and what she had left in the satellite.

Erik cried, but not the tears-shedding kind of old. He relived past times with Karen as he waited the few days before his embryo was ready. Their wedding, on top of a mountain in southeast Idaho; helping Karen through the flu; childbirth and raising their children—he hadn't seen nor heard from either since the singularity. They had been caught up in the newfound freedom like so many people. All the while, he felt Karen's presence, the touch of her when they were in bed together, the sense of being part of her when they had intertwined.

And now Karen was this little, frail creature that would live out a short century or so of life, then either get carried with the singularity, or vanish forever.

Erik's embryo was ready. Without further pause, he injected himself into its mind. A set of memories worthy of godhood faded, disappeared.

And then, with a flash of light as he exited the womb, and his first breath, his life began.■

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Distance

Maya Kaathryn Bohnhoff

The basis of conversation is a shared interest, and things may be a bit slow getting started if you don't know what that interest is!

In the movies, you were slumped at your computer console, fast asleep, surrounded by empty Pepsi cans and candy wrappers, when the system pinged. You woke on a tide of adrenaline, flinging candy wrappers and crumpled cans to the lab floor and, after a moment of disorientation, realized *what that sound meant.*

In reality, Dr. Santiago Rodriguez was standing in the middle of the lab stuffing his face with nachos when the Signal Detection System spoke—figuratively speaking. What the interface actually did was fire an alarm that played the five-note sequence from *Close Encounters of the Third Kind*, at Dr. Mukerjee's whimsy.

When he'd first come to Project Quetzalcoatl, Santiago had jumped out of his skin every time the system pinged. Now, three years and many false alarms later, he didn't even twitch. Now, he stood chewing like a contented cow, contemplating a response to the summons. Most likely it meant another bogey or that Kev and Roz would have to run diagnostics, which would mean pulling the Spectrum Analyzer and Signal Detection Subsystem offline for a day or two.

He was strolling over to the SDS console when Gita Mukerjee poked her head in the door. "Snag a tire, Sandy?" she asked, but her eyes were hopeful.

Santiago laughed, set aside the nachos, and dusted his hands off on his jeans. "Heck no, Gita. I got me a live one this time." He dropped into his chair and swiveled to the display.

"Any of those nachos left?"

"Uh, yeah . . . Kitchen." His mind was already occupied with the data. He got a raw read on the left, a waterfall plot of the data on the right. He was still studying the waterfall plot of the side band when Gita returned from the kitchen with a small plate of nachos.

"What have we got?" she asked.

"Not sure. Come look at this." He felt a peculiar wriggling in his stomach. Nachos were no longer of any interest. He was seeing pulses in the microwave window—pulses that were clearly patterned. They played in series, paused, then picked up again. There was very little drift. *But* the carrier wave was in the 1500-MHz range and looked familiar. In fact, Santiago could put his hands on any num-

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ber of archived log entries that had recorded the same signal.

It didn't look like a glitch. Those were generally more capricious. And the few hackers who'd tried to get bogeys into the system had been unable to get past the first Follow-Up Detection Device or couldn't resist tapping out "ET phone home" in Morse code or something equally precious.

Santiago looked up at Gita. "What do you think, Dr. Mukerjee?"

"Well, Dr. Rodriguez, I think we need to call a pow-wow. This looks like a job for the FUDDs."

The small conference room was dim and hushed. The handful of scientists sat expectantly, their eyes on the screen at the front of the room where Santiago Rodriguez stood next to the podium that held his laptop.

"The data signal is in the 2-GHz range," Santiago told the gathering. "It's regular and repeats in cycles. It *seems* to be coming from the direction of the constellation Taurus." He hesitated, allowing himself a bit of wonder at the words he would say next. "At a distance of 100 AU."

He watched the others' faces as they digested the information; saw that Gita Mukerjee, seated at the edge of the group, was doing the same.

Their program director, Dr. Kurt Costigyan, studied the screen intently, eyes roving over and over the figures there.

"That's outside the heliosphere," said one of the techs, a lanky redhead named Kevin.

Santiago tapped the touch pad on the laptop and the projection on the screen beside him changed to a graphic representation of the signal's source. He tapped a second time and a waterfall plot from the spectrum analysis opened on the right side of the screen.

"Oh, wow," said Kevin.

"Here's the carrier signal . . ." Santiago switched the display again to show a second waterfall plot.

"I'll be damned." Kurt Costigyan sat back in the plastic conference chair. He was a big man; the chair squeaked loudly in protest. "That's Pioneer 10."

Santiago didn't realize he'd leaned so heavily against the podium until it scraped away from him across the floor. He straightened. "That's what we thought, but . . ." He glanced over at Gita Mukerjee. "We don't see how. She's so far out."

"And she's so dead," said Kevin. "Those old power cells couldn't possibly send from that distance. Even if she was turned in the right direction."

"Couldn't possibly?" asked Gita, gesturing at the screen.

"Okay, *shouldn't* be able to."

Kurt looked up at Santiago. "I didn't know you were scheduled to ping Pioneer."

"We weren't."

"Then why. . . ?"

Santiago licked his lips. "We didn't ping her—if this really *is* her—she pinged us."

"With this . . . pattern?"

Santiago nodded, then clicked up another screen. This one came with a shower of noise that sounded like a Flamenco dance played at warp-speed. The graphical display showed the pulses as dashes and dots of white on black. The sequence was composed of multiple series of long and short pulses divided by mere seconds of silence.

"Oh, please tell me that's not Morse code," said Kurt.

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"Not Morse code," Santiago assured him. "If you listen real carefully, you might be able to catch the pattern, but I'm glad we're not relying on our ears to decipher this. The spectrum analyzer pulled it apart pretty efficiently, and came up with this." A key press brought up a window atop the display of dashes and dots. This one showed a series of eight numbers:

18.9, 27.44, 27.44, 27.44, 27.44, 103.6, 121.9, 99.1

Kurt's eyes flickered between the exposed portion of the graphic and the numbers. "Okay, so it's eighteen long pulses and nine short?"

"'Long' being purely arbitrary," said Gita. "Those pulses can't be more than . . ."

"A quarter-second," said Santiago. "Then there's a half-second pause before the next set starts: twenty-seven long; forty-four short, and so on. Then, there's a three-second pause after the last repeat of 27.44. Then there's about a nine-second pause after the last number and the whole sequence starts up again with 18.9. It repeats twice per minute, roughly. It's sending steadily—hasn't stopped since we picked it up."

"Without variation?"

"Without variation."

"God almighty," said Roz Klein. A software technician, she sat beside Kevin, elbows on her knees, eyes glued to the screen.

"Probably not," said Kevin.

Roz reached out and punched his arm without taking her eyes from the screen.

"Ow! Look, that's a complex signal. Do you think it could possibly be latent? Some piece of programming that's just started regurgitating old messages?"

Gita Mukerjee smiled. "You mean Pioneer is dreaming?"

Kevin chuckled. "You're not going to get all mystical, are you, Dr. Mukerjee?"

Gita ignored him. "I'd say our next step would be to set this contact up for follow up and check Pioneer's logs to see if a similar pattern occurred during a previous transmission."

Kurt nodded. "What FUDDs do you want to use?"

"Lick and Parkes," said Gita. "Jodrell Bank is in the middle of an equipment upgrade."

"Consider it done." Santiago shut off his laptop, sending the screen into darkness. The roomful of scientists gave an audible sigh.

"In the meantime," said Kurt, "let's design and prep a return signal." He paused, took a deep breath. "And call NASA."

"Been awhile." Santiago's Aussie counterpart at Parkes Observatory sounded preternaturally perky. "ET not biting much these days?"

"ET's not biting at all," said Santiago.

"Then what's up?"

"We think we've gotten a message from an old friend; we need you to verify. We've got a 1500-MHz carrier wave with pulses. Distance approximately 100 AU in the direction of Taurus."

"Pioneer? You're kidding."

Santiago chuckled. "Well, if I am, you'll be the first to know."

He called Lick Observatory in Santa Cruz, California next, receiving a similar reception. As he downloaded the contact information, he was amused to find that his palms were sweating. And why not? Pioneer 10 was supposed to be dead, her batteries and fuel cells long exhausted, her antenna eternally locked in whatever direction she happened to have tumbled.

She might have been struck by something that coincidentally aimed her in the

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right direction, but no amount of coincidence could energize her defunct fuel cells or grant them the power to transmit a coherent sequence of numbers back to Earth.

And they were still transmitting, he discovered upon returning to the lab. He was surprised, too, not by the fact that the sequence of numbers was still repeating, but that Gita had held the huge main radio array trained on that target all afternoon.

"Dr. Mukerjee, this is highly irregular," he teased. "You're neglecting a goodly portion of the heavens."

Gita glanced up from the notepad she was scribbling on and said, "Yeah, well, this is the only portion of the heavens that's interested in conversing at the moment."

Santiago crossed the room and slid into a chair at the console next to her, noticing that the pad was covered with tight clumps of numbers. "Composing a reply?"

"No, actually, I was trying to make something out of these numbers." She grinned ruefully, tucking a strand of ebony hair behind one ear. "For all the good it's doing. There's *clearly* a pattern, I just don't get it."

Santiago looked at the top row of figures. "Divisible by anything constant?"

"This figure that repeats is divisible by 13.72. Ring any bells?"

Santiago smiled. "No."

Gita dropped her pen onto the pad. "I like your idea better. What should we send?"

"Uh, well . . . I'd say we should probably send one of her old command sequences. See if we can't get her to wiggle her ears at us."

"Makes sense. Or we could send a one-to-ten count, then count down from ten to one."

He stared at her for a moment. "Why would we send that? It wouldn't mean anything to Pioneer."

She dropped her eyes to the note pad. "I suppose not."

"But you're just a cockeyed optimist."

She didn't answer, but picked up her pen once more, tapped at the sequence of numbers she'd written across the top of the page. "Spatial coordinates? A location?"

"It's not longitude and latitude. At least not by any system I know."

She shook her head. "I guess we should just send a command sequence. Let's ask her to ping us."

They did just that, and roughly twenty-seven hours later, there was a pause in her broadcast. But then, instead of giving the programmed response to the command sequence, she simply began sending her original sequence of numbers again. Shortly thereafter, both follow-up detection locations called to verify the 'hit,' and confirmed location and range. The contact could only be Pioneer 10.

Kurt Costigyan sat in silence for a moment after Santiago delivered the news, then grinned and said, "Cool. I'm going to call a press conference. Contact NASA and let them know it's official—the prodigal has phoned home."

NASA was delighted. The press was full of questions, mostly unanswerable: Why was Pioneer signaling now, after such a long silence? What had prompted it? What did the signals mean? Why didn't she respond to their command sequences?

That, at least, Kurt thought, was fairly easy to explain. "Chances are," he told the flock of science reporters, "the receiver is damaged."

"Does that mean you won't try contacting her anymore?"

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"Not at all. We'll certainly keep trying. It's also possible that her signal processor is malfunctioning. The sequence we sent may not raise her, but another one might."

While bits of their press conference played in living rooms across the US and Canada, Team Quetzalcoatl pondered their next message to Pioneer 10. It was Kurt Costigyan who came up with the winning entry.

"Why don't we echo the sequence she's sending back at her?"

"Doesn't it make more sense to send a standard message?" Santiago argued.

The project liaison, Dr. Peter Grace, who had arrived that morning from NASA, was quick to agree. "It makes a lot more sense. Sending a message she won't even recognize is just a waste of project time and money."

"We've already sent a standard command sequence and were roundly ignored," said Kurt. "I'd like to try something different."

"Why not compromise?" suggested Gita. She sat so far forward in her chair, Santiago was afraid she was going to fall out of it. "Send a standard sequence followed by the echo. Or *vice versa*."

"Look," said Grace, "Pioneer is still a NASA spacecraft. You guys drew the job of monitoring her, but I think in this department, NASA should call the shots. Send a command to run a diagnostic and report status."

"It's *our* processor time, dammit! If we want to send a recipe for Masoor Dal we should be able to send it."

Kurt let out a crack of laughter. "Good Lord, Gita! Save some energy for the House Budget Committee."

"Yeah," said Kev, eavesdropping from where he huddled in a tangle of wires behind one of the equipment racks, replacing a bad cable. "Besides, if you sent Masoor Dal to ET, you'd start an interstellar war. They'd think it was a biological weapon."

"Just because you can't handle Indian food—" Gita began, but Kevin popped out from under the console waving the faulty cable.

"You're ready to rock, boss," he told Santiago.

Santiago glanced at Kurt. "What are we sending?"

Kurt shrugged. "Standard command sequence requesting a diagnostic and status. If that doesn't work, we'll take it from there."

"Meaning we'll send the echo?" asked Gita.

"Meaning we'll cross that bridge when we come to it."

They sent the request for status exactly as stipulated. During the wait for Pioneer's response, they fielded several emails from their loyal Quetzalcoatl devotees offering all manner of explanations for the message Pioneer had sent. The most interesting ones encouraged them to work the numbers out as dimensions. But while it was true the repeated figure could form a square 27.44 inches, feet, meters or whatever on a side, the other figures seemed to bear no relation to each other.

The window of probability exhausted itself on a Sunday afternoon. Pioneer stopped transmitting for a period of five minutes, suggesting that she had received the command sequence and was processing it. Then she began transmitting again—the same eight numbers in the same order.

At that point, Drs. Rodriguez and Mukerjee, finding themselves alone with a titanic radio telescope and seventy-five gigaflops of computational horsepower, decided to queue a message of their own to Pioneer 10 so that if, by some chance, it were approved, they'd be ready to send it.

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Santiago was keying in the message when their Program Director strolled into the lab. Gita jumped guiltily and straightened from where she had been peering over her colleague's shoulder.

"My, but you two look like a couple of cats caught sizing up the canary," observed Kurt. "What's up?"

The two exchanged glances, then Santiago said, "We just wanted to be ready in case Dr. Grace let us send another sequence."

"Dr. Grace will not be back until Tuesday. He had a pressing matter to attend to at Kennedy Space Center."

Gita's face fell. "You mean we have to wait until Tuesday to try again? Kurt, that's a waste of time! We should send *now*."

Kurt's eyebrows rose in an exaggerated arc. "Who said we had to wait? As I recall, the transmission schedule is the Program Director's purview. I assume you've queued the echo?"

Santiago nodded.

"Well, then why don't you just ask the Program Director if you can send it?"

Rodriguez and Mukerjee exchanged glances, and Rodriguez asked, "Dr. Costigyan, is it your opinion that we should echo the Pioneer's last message?"

"Make it so."

Santiago hit 'send,' confirmed, then sat back in his chair. "Well, there it goes. Now we wait."

"You did *what*?" Dr. Grace was incredulous.

Kurt looked up at him from behind his desk. "I said: we sent the echo."

"It's a waste of time, Kurt."

"I happen to disagree. We're still scanning other areas. The only time it took was Sandy's time queuing the sequence."

"Sandy?"

"Dr. Rodriguez. Of course, Dr. Mukerjee was in attendance, so I suppose you'd want to argue that she wasted her time, too."

Grace shrugged and dropped into the chair across the desk. "It's your staff, doctor. If you don't mind them pursuing wild geese—"

"Excuse me—Dr. Costigyan?" Roz Klein stood in the door of his office, her face flushed. "Pioneer is responding."

The lab was as quiet and tense as a hospital waiting room. Quetzalcoatl staffers—techs, engineers, software experts, and the science crew—had come out of the woodwork to attend, every one of them trying to peer over Santiago Rodriguez's shoulder at his screen.

"What do we have?" Kurt asked, pushing through a cluster of techs.

Santiago glanced up and Gita vacated her chair to allow Kurt to take her place.

"She paused, as usual. This time for exactly three minutes, fifteen seconds. Then she resent the original sequence. We thought, 'Okay, that's it, she's just . . .'" He glanced at Gita. "'. . . just dreaming.'"

"Dreaming?" repeated Dr. Grace.

Gita flushed. "Spinning off old data. Reliving old broadcasts."

"But then the sequence changed," said Santiago.

"Show me." Kurt rolled his chair closer.

"The pattern is the same," Santiago told him as he shifted the display to show the decoded output of the Multi-Channel Spectrum Analyzer. "And the first part of the sequence is the same: 18.9 and 27.44 repeated four times. Then it changes:

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103.6, 134.1, 99.1. One digit off from the first sequence. Now, the third sequence—"

"The *third* sequence?" repeated Kurt.

Santiago nodded. "The third sequence starts out just like the other two—an identical sequence of five numbers. But this time the last three numbers are: 108.2, 121.9, 107.6."

"Completely different," observed Grace.

"But the seventh number is the same as in the first sequence," said Kurt. "That could be significant."

Grace shrugged. "And it could be mere chance."

"But look at the first set of five numbers," said Santiago. "It's the same for each set. That's hardly random."

Grace shrugged again. "Why should it be? Pioneer may not possess any intelligence of her own, but she was created by an intelligence. She's spitting out available data—data we've given her—she's just not doing it in a form we understand."

"Whoa! There's a fourth sequence!" Santiago Rodriguez's voice, quiet as it was, cut through the discussion taking place over his head. The silence was immediate and thick.

"First five figures, the same . . . then 96.9, 124.4, 95.7."

Kurt leaned in to look at the series of numbers now lining up across the screen. "Okay, now the end of the sequence is completely different. The only thing obviously common is that the seventh figure is always larger than the others."

"You think we'll see that same pattern in the next sequence?" asked Grace.

"If there is a next sequence," said Santiago.

There was. It began as they all began, but the last three digits were 96, 122.5, 96. Not one of them matched a previously sent number. New sequences of numbers continued to come in—thirty unique sequences in all. Then there was a pause and they began to repeat, beginning with the initial sequence, and replaying in exactly the same order as they were originally received. Occasionally, there was a repeated digit, but there seemed to be no pattern. When it became clear that no new sequences were going to appear, Kurt called an analysis session.

While machine intelligences compared numbers, biological intelligences mulled patterns in their own way. They considered spatial coordinates, global coordinates, geometric figures.

"The second, third, and fourth numbers form a square," said Santiago, doodling on the white board in the conference room. He used a scale of one-half inch per unit, so the figure would fit on the board. "And the last three numbers could be the sides of a triangle."

"What about the first figure?" asked Gita. "What do you make of that? A line?"

Santiago drew a line 30.3 inches in length. "Yeah. Maybe . . .maybe that's it—a line between two points, then a figure with three points, then a four-sided figure."

"Except," said Grace, "that they didn't arrive in that order. They came one, four, three."

"Maybe 18.9 is the diameter of a circle," suggested Gita. "Or the circumference. They could be showing us that they understand geometric constructs."

"They?" repeated Grace.

Gita flushed. "Did I really say that?" She shook her head. "Too many episodes of X-Files. Sorry."

"Hey," Kurt said, "it's why we're here—right, Dr. Grace? But why would the triangle—and only the triangle—vary in size?"

The question was met with silence.

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They resorted to computer assistance at that point, generating two different sizes of circles, a square, and a series of thirty triangles—thirty lopsided, irregular triangles. They put the circles inside the squares, and the squares inside the triangles, oriented them in numerous ways. Nothing rang a bell, for either human or machine. In the end they sat back, mentally exhausted, and stared at the pages taped to the walls of the conference room—circles, squares, and/or triangles on every one.

"All right," said Kurt. "It's geometry. But why the subtle differences? Why such regularity in the first set of numbers and such irregularity in the second? And why the oddball matches? They've got to be significant."

"Do they?" asked Santiago. "If this is Pioneer spinning dreams or having the machine equivalent of a near-death experience, then maybe the variations are merely extrapolations on a program they created for a First Contact scenario."

Gita shook her head. "They didn't program a geometry set like that into Pioneer. Roz and I went over every one of the First Contact protocols. There's nothing like this anywhere in her routines. Besides, Pioneer can't extrapolate. She's a machine. An *old* machine. A dying machine."

"Look," said Kurt, rubbing his forehead, "let's assume for a moment that Pioneer is merely expiring much later than expected and that for whatever reason she went off on her own, scrambled a bunch of old messages and sent them home. Let's assume that she refused to respond to familiar command sequences because they no longer seemed familiar. That she responded to an echo of her own unprovoked transmission because it *did* seem familiar. And let's further assume that receiving that echo caused her to randomly change the second set of numbers in what is now her default data set. Let's also assume that these numbers are dimensions for geometric shapes. What should our response be?"

"Why respond at all?" asked Gita. "That's what our friend from NASA would say. If this is Pioneer, the only significance is that she seems to have resurrected herself."

"Like Quetzalcoatl?" murmured Santiago.

Gita's dark brows arced gracefully. "Exactly. Score one for old rocket scientists. But if that's the case, there is no intrinsic significance to her message, above the incredible fact that she was able to send it at all. Any return messages we send should be targeted to keeping her online as long as possible, maybe getting her to return to an old routine, send some real data."

"I hear a definite 'but,'" said Kurt.

"But . . . if this *isn't* Pioneer, then this message is more significant than we can possibly imagine and our response should be targeted to letting whoever programmed that message know we got it and understand what we got."

"They already know we got it," said Santiago. "If there is a 'they.' And we *don't* understand it completely."

Gita ground the heel of her hand into her forehead. "But isn't that enough? Can't we send some geometry of our own?"

"Let's work on it," Kurt said. "Tomorrow, when I don't feel so much like a zombie. Let's sleep on it. Maybe one of us will have an epiphany."

If there were no epiphanies to be had in Puerto Rico that night, there was at least a piece of one in British Columbia. It came during the ten o'clock news in a living room in the town of Chilliwack.

The man had half risen from the sofa, mentally already in bed when the story about messages from space caught his attention and the numbers being scrolled

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out across the screen, his curiosity.

He sat back down.

Four orderly rows of figures later, he reached for a steno pad, flipped to a page devoid of Scrabble scores and wrote the numbers down. In the end, his pad contained thirty rows of eight figures each.

18.9, 27.44, 27.44, 27.44, 27.44, 103.6, 121.9, 99.1
18.9, 27.44, 27.44, 27.44, 27.44, 103.6, 134.1, 99.1
18.9, 27.44, 27.44, 27.44, 27.44, 108.2, 121.9, 107.6
18.9, 27.44, 27.44, 27.44, 27.44, 96.9, 124.4, 95.7
18.9, 27.44, 27.44, 27.44, 27.44, 96, 122.5, 96
18.9, 27.44, 27.44, 27.44, 27.44, 102.2, 111.3, 96.9
18.9, 27.44, 27.44, 27.44, 27.44, 100.6, 120.4, 100.6
18.9, 27.44, 27.44, 27.44, 27.44, 103, 125, 103
18.9, 27.44, 27.44, 27.44, 27.44, 99.1, 121.9, 99.1
18.9, 27.44, 27.44, 27.44, 27.44, 100.6, 123.7, 100.6
18.9, 27.44, 27.44, 27.44, 27.44, 100.6, 122.5, 100.6
18.9, 27.44, 27.44, 27.44, 27.44, 99.7, 123.4, 100.6
18.9, 27.44, 27.44, 27.44, 27.44, 100.6, 121.9, 100.6
18.9, 27.44, 27.44, 27.44, 27.44, 100.6, 123.1, 100.6
18.9, 27.44, 27.44, 27.44, 27.44, 102.1, 121.9, 102.1
18.9, 27.44, 27.44, 27.44, 27.44, 100.6, 124.4, 100.6
18.9, 27.44, 27.44, 27.44, 27.44, 100.6, 124.9, 100.6
18.9, 27.44, 27.44, 27.44, 27.44, 99.1, 123.1, 99.1
18.9, 27.44, 27.44, 27.44, 27.44, 104.9, 124.4, 99.7
18.9, 27.44, 27.44, 27.44, 27.44, 100, 121.9, 100
18.9, 27.44, 27.44, 27.44, 27.44, 105.8, 121.9, 105.8
18.9, 27.44, 27.44, 27.44, 27.44, 101.5, 121.9, 96.9
18.9, 27.44, 27.44, 27.44, 27.44, 102.2, 123.1, 105.2
18.9, 27.44, 27.44, 27.44, 27.44, 101.8, 121.9, 99.1
18.9, 27.44, 27.44, 27.44, 27.44, 99.1, 123.4, 99.1
18.9, 27.44, 27.44, 27.44, 27.44, 205.8, 135.6, 106.7
18.9, 27.44, 27.44, 27.44, 27.44, 102.1, 122.2, 100.6
18.9, 27.44, 27.44, 27.44, 27.44, 100.6, 124.1, 101.8
18.9, 27.44, 27.44, 27.44, 27.44, 96, 123.1, 98.1
18.9, 27.44, 27.44, 27.44, 27.44, 100.9, 123.4, 99.4

The pattern seemed familiar. Damn familiar. But elusively so.

"Bill? You coming to bed?" Barbara had apparently finished her crossword puzzle.

"In a minute, babe."

"You're not writing, are you? You know you're more likely to write crap than cream at this hour of the night."

She was right, of course. "I'm not writing. I'm watching the news."

"All right, then." Barbara subsided.

Bill leaned his head toward the TV to catch what the SETI guy was saying about geometrical figures. They thought the old Pioneer 10 spacecraft was speaking to them in geometry. When asked why this was happening, a pretty East Indian woman—a Dr. Mukerjee—said that they thought Pioneer's deteriorating condition had caused the old spacecraft to start running some mangled first-contact programming.

She smiled (it was a dynamite smile) and said, "I like to think she's dreaming."

Bill sat back on the sofa. Now that was one for the books—a dreaming space-

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craft. He waited for them to show the geometrical shapes they thought lived in the neat rows and columns of numbers. They didn't.

Miffed, he hunkered down to do the math himself.

"Bill? Are you sure you're not writing?"

He flipped the steno pad shut, slid the pencil back into the spiral binding, clicked off the TV, and went to bed.

Peter Grace rubbed the back of his neck absently. "Okay, next time you guys come up with a hare-brained idea I'll just chalk it up to thinking 'outside the box' and go with it."

Kurt grinned. "Hey, that hare-brained idea got us 240 data points."

"Don't rub it in." Grace shook his head. "You're an unorthodox son of a bitch, Kurt, but I guess that's why you're out here in the first place."

"And not at NASA with the real scientists?"

"Didn't say that; didn't mean to imply it." He pushed his glasses back up his nose. "So, what's our next move?"

Kurt laughed. "What makes you think we've got one?"

The steno pad lay on the coffee table in the living room. Bill picked it up on the way to the kitchen, where he pecked his wife on the cheek, poured himself a cup of fresh, hot coffee and sat at the kitchen table to think about geometric figures. By the time Barbara put a plate full of scrambled eggs in front of him and sat down catty-corner, he was doodling lines, circles, squares, and triangles. He studied what he'd done as he shuttled eggs to his mouth.

"What's that?" Barbara asked.

His mouth full, he rotated the pad so she could see what he was doodling.

She frowned, shrugged, shook her head. "I still don't know what it is."

"Well, neither do I, exactly," Bill said. "These rows of numbers are being sent to Earth by the old Pioneer 10 spacecraft. Problem is, the scientists weren't expecting her to send anything and they can't figure out why she's sending this all of a sudden. They don't know what it is, either."

Barbara smiled, puckering the little crow's-feet at the corners of her eyes and firing up her dimples. They were turning to creases now, but he still loved them. "And you think an old writer can figure out what a bunch of NASA brainiacs can't?"

Bill shook his fork at her, flipping eggs across the table. "Don't disparage old writers. There is a compendium of knowledge about a great many things in this noodle. Scientists, on the other hand, tend to specialize. I just need to figure out which of my many veins of generalized knowledge this pertains to."

He reached for the pad, glancing as he did at the page full of circle-square-triangles. They were tip-tilted now, standing on end.

He set down his fork. "Son of a bitch."

"What?" Barbara asked, but he didn't hear her.

He snagged the pad back and stared at it, caddy-wumpus, then turned to a clean sheet. "We got a ruler, babe?"

"Uh-huh." She got up, pulled it out of the junk drawer beneath the telephone, and flipped it to him. He caught it without looking up.

After watching him for a moment, Barbara cleared her dishes and left him to his doodles.

"This number appears eight times in the sixth place and nine times in the

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eighth place—that's seventeen times altogether."

Santiago brought his laser pointer to the number 100.6 in the chart projected onto the screen in the conference room. Kurt Costigyan and Gita Mukerjee followed the red beam in the semi-darkness.

"It *never* occurs in the seventh place," continued Santiago. "*This* figure—121.9—occurs nine times in the seventh place, but *never* occurs in the sixth or eighth. All in all, there seems to be no actual pattern, although in fourteen cases, the number from place six is repeated in place eight. In seven instances, the repeated number is 100.6."

Kurt rubbed his hands over his face in a gesture of weariness. "I don't even know what to suggest we send next."

"So far," said Gita, "the geometric figures seem to be nested. Circle in square in triangle. What if we add a larger circle that contains all the previous figures?"

"Bring it full circle?" punned Kurt wryly.

"Har-har-har," said Gita.

"Okay." Santiago scrolled through the thirty rows of data. "Which data set do you want to work with?"

"The first one," Gita suggested. "I'm thinking we calculate the circle so that its diameter is a multiple of the first circle's diameter. If this is some kind of progressive loop, then we should see another square that is built on a multiple of the first one in some way."

"Sounds like a plan," said Santiago. "Let me just rack 'em up. What multiple of 18.9 would you like, ma'am?"

"Oh, how about seven? That ought to clear the points of the triangle."

Kurt Costigyan had just gotten up to stretch when the phone rang. He picked it up, expecting it to be his wife demanding to know when he intended to come home. It was their admin, Rosa, sounding a bit flustered.

"Doctor, there's a man calling long distance from *British Columbia*. He wants to talk to . . . um . . . one of our experts about the messages from Pioneer."

"Does he say why, in particular?"

"He saw the story on the news the other night and he *says* he thinks he knows what the message is about."

"Oh? And what does he think it's about?"

"He won't say. He wants to talk to an expert."

"I guess that would be one of us. Okay, put him on," Kurt said, reasoning that if he talked to the guy and made him think they took him seriously, he'd be much more likely to go away and stay gone.

"Hello?" The voice sounded dubious, as though the guy suspected he'd been put on hold indefinitely.

"Hello, this is Dr. Costigyan. I'm Director of the Project Quetzalcoatl Signal Detection Group. You . . . you have some information relating to Pioneer 10?"

There was a moment of profound silence, then the caller said, "Look, I know you figure me for a crackpot, and in some ways you'd be right, but I really do have an idea about this message."

It was Kurt's turn for thoughtful silence. "All right. What do you think it's about?"

"If I told you flat out, you'd be sure I was a crackpot. Let me ask you this: What's it doing now?"

"It's . . . still sending the same sets of data."

"Thirty of 'em?"

"Yes."

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"And no more?"

"No more."

"In the same order every single time?"

Now Kurt was intrigued. *Order*. "Yes, as a matter of fact. Is that significant?"

"Could be. Have you sent anything back yet—since it started sending the thirty sets, I mean?"

"Not yet. We were just now preparing a response."

"What were you planning to send?"

"A number that would describe the diameter of a circle that will encompass the entire set of geometric figures."

"Wrong. That's not it."

"No?"

"No. What you need to do is this: take the first set of numbers. The ones you got first, I mean." He repeated them for good measure. "But either at the beginning of the sequence or at the end, add this: 4, 20, 19, 12."

"May I ask why?"

"Just testing a theory. What've you got to lose, right? The ship's on her way out—hell, you thought she was gone already, didn't you? If I'm wrong, you lose a little chatting time. If I'm right . . ."

"If you're right—what?"

The caller laughed. "Hell, I don't know. Damn! I really don't know."

"May I ask who this is?"

"My name's Bill. Bill Kinsella."

"Well, thank you, Mr. Kinsella. If we can't raise a response with our current approach, maybe we'll try yours."

"When?" Kinsella insisted.

"Well, we'll try our response tonight. And then it will take about twenty-seven hours to see if there's a response."

"Twenty-seven hours?"

"She's 100 astronomical units out from Earth, Mr. Kinsella. That's a long—"

"I know how far it is. I read."

"Sorry, I didn't mean to—"

"That's all right. But if you do try my . . . my idea, you let me know what happens. I left my number with your secretary. If I don't hear in a week, I'll call back."

Of course you will, Kurt thought wryly, and rang off.

"4-20-19-12? Isn't that one of those low-cost call gimmick numbers?" Gita leaned back in her chair and put her feet up on the conference table.

"Did he say why he thought that would work?" asked Santiago.

"Nope. He was pretty tight-lipped."

"You're not really thinking of sending that, are you?"

Kurt shook his head. "We want to keep Pioneer chatting with us. I think our best chance of that is to follow the geometric progression as Gita suggested."

It made perfect sense to do that, Kurt thought twenty-seven hours later when they received Pioneer's response. As usual, she paused to receive the data and process it, before sending a return message. This time the pause was longer, as if their response puzzled her, then she continued sending her thirty sets of data as if they'd sent nothing at all. She seemed only to take a very deep breath before taking it, once again, from the top.

Like a teacher dealing with a particularly slow student, Kurt thought, staring

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across the lab where a screen saver wove multi-colored twists.

"Apparently, that wasn't what Pioneer was expecting," said Gita.

"Expecting?" Peter Grace took a sip of his coffee, made a face and added more sugar. "Dr. Mukerjee, Pioneer wasn't expecting anything. She's just firing back broken bits of data."

"What was it you said about us thinking outside the box?" Kurt asked mildly.

"Oh, all right. But be honest, Kurt—isn't it just as likely that Pioneer changing her message earlier was just coincidence?"

"No."

"True believer."

"Jade. Maybe you should get out of space science and into something that requires less imagination—accounting, maybe."

"I hate to interrupt this mutual admiration society," said Gita, "but what's our next move? Are we going to send that guy's message?"

Grace frowned through the steam that lingered above his coffee cup. "What guy? What message?"

"A gentleman from Chilliwack, B.C. saw a news broadcast of our last press conference and called to say he knew what we should send next."

"Oh really. And that would be?"

"4, 20, 19, 12," Kurt said.

"Why?"

"Didn't give a reason why. Just testing a theory, he said."

Grace's brow puckered again. "Is that a date?"

"A date?" Santiago returned blankly.

"I don't know," said Kurt. "I hadn't thought of it that way, but I suppose it could be. He asked about the order the numbers came in. Wanted to know if the sequences were always in the same order. Maybe this date—if it is a date—has something to do with the order the data is delivered in. Though I can't imagine what."

"Hm. And maybe it's the date his mommy and daddy were abducted by aliens."

Santiago looked over at Kurt from the Signal Detection console. "You did tell him you'd use his sequence if ours failed. And I'm fresh out of ideas. We might as well send it while we're trying to come up with something else."

Grace snorted. "You're kidding. You're not going to authorize—"

Kurt smiled, tapped his forehead, and said, "Outside the box, Peter."

"Do you have any reason to think this might work?"

"None. But Sandy's right—we might as well send something."

They sent: 18.9, 27.44, 27.44, 27.44, 27.44, 103.6, 121.9, 99.1, 4, 20, 19, 12.

Just over twenty-seven hours later, Pioneer's return message began with the characteristic pause. Then she started into a sequence: 18.9, 27.44, 27.44, 27.44, 27.44, 108.2, 121.9, 107.6, she said. The *second* sequence. And she added: 4, 20, 19, 12.

"Whoa," said Santiago, taking in the complete sequence. He glanced up over his shoulder at Kurt Costigyan, colors from the MCSA display patterning the side of his face. "Now what do we do?"

"Now, we give Mr. Kinsella a call back."

"Well, this *is* a surprise. I didn't expect to hear from you. I kind of figured I'd have to nag." Bill Kinsella raised eyebrows at his wife and mouthed "It's *them*" across the kitchen table.

"No, Mr. Kinsella," said the caller, "we tried your sequence of numbers right after . . . well, right after our sequence failed to get Pioneer's attention."

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When the man from SETI—Dr. Kurt Costigyan, he called himself—hesitated, Bill prompted, "Well, don't keep me in suspense, Kurt. Did it work?"

After a moment more of hesitation, Costigyan said, "Pioneer returned a second set of numbers, and added the same sequence you gave us to the end of it."

"Damn. Which set was it?"

"The second set."

Bill looked at the list of names and numbers he'd scribbled in his steno pad. "*Damn*," he said again.

The scientist cleared his throat. "Does that number mean something to you, Mr. Kinsella?"

"Yes, sir, it does."

"May I ask *what* it means? Some of us thought it might be a date."

"It is a date. At least, to me, it's a date. I don't know what it is to your little robot friend."

"If you were to . . . What would you send next?"

"Well, the logical thing would be to send the third sequence again and add 4, 23, 19, 14 to the end of it."

There was a pause before Costigyan asked, "May I ask why that would be logical?"

Bill sighed. This man was going to think he was a lunatic. "Trust me: that date goes with the third sequence of numbers."

"Mr. Kinsella—"

"I know I'm being cantankerous and mysterious, but if I tell you what I'm thinking, you'll hang up on me."

"I won't, I promise, Mr. Kinsella. I won't hang up."

"Call me 'Bill.'"

"I promise I won't hang up, Bill."

"Look, try this—send this batch of numbers, and if it comes back with . . . well, with the next logical sequence, I'll tell you what I think it's all about."

"Wait, you're telling me . . . you can predict what Pioneer is going to say *next*?"

"In a nutshell, yeah. If I'm right, Pioneer's response to this message will be to add 4, 18, 19, 23 to the fourth set of numbers."

"But you won't tell me why," said Costigyan, frustration creeping into his voice. "Will you at least tell me what you think the numbers are—generally speaking?"

"Well, sir, I think they're dimensions. But not geometrical shapes, exactly."

"Dimensions." There was another pause, then the scientist asked, "Are you a mathematician, Mr. Kinsella—Bill?"

"No, sir. I'm a writer. Of fiction. Not science fiction, though, in case you were wondering."

"He's a *writer*?" repeated Peter Grace. "A *fiction* writer is driving your game plan?"

"He's getting results," argued Gita. "Which is more than our well-considered responses are doing."

"Let me guess—he writes science fiction, right?"

"He says not," said Kurt. "Besides, as Gita said, he's getting results. You can't argue with that. I think we're pushing the envelope of coincidence. So here's our test case—he's given me a new sequence and told me what response he expects. We might as well send it and see what happens."

Grace muttered something under his breath about looking silly, then said, "I'll tell you what you're going to get. She's going to repeat what you send, just like she

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did this last time."

"But she added it to a different sequence of numbers."

"Of course she did, Kurt. She's locked into that program of thirty data sets. She ran what's now her normal sequence and tacked exactly what you sent to the end of it. No mystery, there."

Kurt shrugged. "Maybe you're right. But we've got nothing to lose, right?"

"Hell, no," said Grace. "Just our professional dignity."

They sent the data. They waited. Within ten minutes of Pioneer's answer, Kurt Costigyan called Chilliwack, B.C.

"Well, Bill," he said, "she gave the answer you were expecting. I think we need to talk face to face. Are you willing to meet with me?"

"In Puerto Rico?"

Kurt chuckled. "I was thinking of someplace in between. There's an observatory in Santa Cruz, California . . ."

"William Patrick Kinsella," the man said, holding out his hand.

Kurt Costigyan took it, thinking that he surely must have meant to say 'Mark Twain.' Tall, lanky, and spare, he had a wavy fringe of collar-length hair that was going from gray to white. Mustache and beard to match. Hazel eyes sparkled behind wire-rim glasses. There, the resemblance to the Twain archetype ended; he wore a cowboy hat and a blue chambray shirt. Kurt guessed him to be in his seventies.

"Dr. Kurt Costigyan," Kurt said. "This is my colleague, Dr. Peter Grace, from NASA."

"Kinsella," repeated Grace, shaking the older man's hand. "Didn't you write that movie. . . ?"

"I wrote a book that got made into a movie," Kinsella said, warily, Kurt thought.

"A fantasy movie," said Grace, passing him a look.

"Fantasy," said the writer, "is in the mind of the reader. You're talking across millions of miles of space to a glorified Tinkertoy. How fantastic is that?"

Grace raised his eyebrows but didn't offer a comeback.

"Can you send messages to Pioneer from here?" Kinsella gestured around the observatory's main lab.

"No, but we can have Arecibo send them."

"And what messages will we be sending?" asked Grace, his voice patronizing.

In answer, Kinsella pulled a steno pad out from under his arm, flipped it open and handed to him. On the exposed page was a table. Looking over Grace's shoulder, Kurt saw the sequences of numbers he'd come to know so well, each sequence in a neat row that ended with a date and a name.

"What . . . what are these?" Grace asked brushing the names with a fingertip.

Kinsella cleared his throat and gave Kurt an almost apologetic glance. "They're . . . um . . . ballparks."

Kurt could feel Grace's eyes on him. "*Ballparks*?"

Kinsella scratched around in his longish white hair. "Your numbers there are the internal dimensions of a baseball diamond, in meters. The first number is the distance from home plate to the mound—18.9 meters, or sixty feet, six inches. The second, third, fourth and fifth numbers are the distance between the bases—27.44 meters or ninety feet. Those numbers are constant for every major league ballpark ever built. The last three numbers are outfield dimensions, which are different in every park."

"And the dates?" Grace asked.

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"Opening days."

Grace's mouth, which had been open, snapped shut. "Come sit down, won't you, Mr. Kinsella?"

The old guy smiled. "Call me 'Bill.'"

"Why would Pioneer 10 be talking to us in baseball?" asked Gita, the bemusement in her voice clear even through the speakerphone. "Was there some sort of database on board that might be spilling first contact information? I mean, maybe one of the scientists on the project was a baseball buff or something."

"A database?" Kurt repeated. "Gita, Pioneer was launched in 1972."

"But there's got to be some reason she's spitting ballpark dimensions at us." There was a moment of puzzled silence, then she said, "Okay. So we've got an aging spacecraft that wants to talk baseball. What do we do about it?"

Kurt looked at Bill Kinsella. "I'd like to try sending all thirty sets of dimensions and dates. Cut to the chase."

Peter Grace looked dubious. "What do you expect to happen?"

"I don't know. Bill, you have any ideas?"

"She might start on player stats next," said Kinsella, then shrugged. "Maybe she'll start giving us box scores. Beats me."

They scanned the handwritten list of dimensions and dates and emailed it to Arecibo where Santiago and Gita fed it to the transmitter.

"Now what?" Kinsella asked.

"Now we wait," said Grace.

Kinsella shook his head. "You scientists do a lot of waiting, don't you?"

Pioneer's response, when it came was anticlimactic. She simply stopped sending. The absence of any signal stretched into minutes, then hours. When three days had passed without her commentary, Peter Grace went back to NASA and Bill Kinsella, after taking in two Giants games, prepared to fly back to B.C.

He was, in fact, standing in the main concourse at SFO with Kurt Costigyan when a bleary-sounding but excited Dr. Rodriguez called from Puerto Rico.

"She's sending again."

"*What* is she sending?" Kurt clutched his cell phone as if it might fly out of his hand, and met Bill Kinsella's eyes.

"It's not so much what as where from. I've checked this through the FUDDs at three separate observatories. Pioneer—if this is Pioneer—is transmitting from *inside* the solar system."

"That's impossible."

"Tell me about it. Can you get back to Lick, ASAP?"

"With bells on. I'll call when I'm there." He hung up, pocketed the phone and blinked at Kinsella. "Well, Bill, I've got to go back to Lick."

"Our girl get talkative again, did she?"

"Yes, she's sending again. And she's apparently headed back toward Earth."

"I didn't think that could happen."

"It can't. You can still catch your plane—"

"You kidding? I wouldn't miss this for the world."

The two men picked up their bags and began to wend their way toward the Ground Transport area.

"By the way, what's she sending?"

Kurt laughed. "I forgot to ask."

* * *

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She was sending new coordinates—longitude and latitude, Santiago thought. And by the time Kurt Costigyan and the 'psychic writer' had checked back in at Lick Observatory, he had been able to generate a map. It displayed on Kurt Costigyan's borrowed computer monitor in Lick's main lab as a U.S.-shaped outline populated with about two dozen points of light.

"I've got to say," Santiago told them as they sat down to study the map, "when we put this together and saw what it looked like, it made us a bit . . . uh, nervous out here. Those coordinates correspond to major American cities."

"No need to be nervous," said Bill, raising salt and pepper eyebrows. "I don't think."

"Then they're not cities?" Gita sounded relieved.

"Oh, I'm pretty sure they're cities," said Kinsella. "Can I ask what order you got the coordinates in?"

"Is that significant?" Santiago asked.

"Could be. Let me guess—the first four were Boston, Detroit, Chicago, and New York."

"Uh . . . yeah. Oh, wait. You're thinking they should line up with the—the list of dimensions. But they don't. There aren't thirty of them."

"Some cities have more than one professional ballpark," said Kinsella patiently.

Kurt closed his eyes. "Okay, okay. Let's think things through. Pioneer 10 suddenly, and without provocation, starts sending us the dimensions of major league baseball parks."

"Except that the list isn't up to date," said Kinsella. "Some of these parks have been replaced."

"Yeah, but how would Pioneer know that?" asked Santiago.

Into the pregnant silence that followed, Kurt Costigyan said, "Sandy, Pioneer 10 doesn't *know* anything. And she doesn't—she *couldn't*—have any information her programmers didn't have back in 1972. Unless . . ."

"Unless," repeated Gita, "someone's been able to hack that archaic code and—and what—send her the dimensions of *baseball parks?*"

"Pre-2000 baseball parks," said Kinsella.

Kurt cleared his throat, making way for words that sounded unreal even in his head. "Let's assume someone could hack her code. How could they reach her *outside* the solar system, when an array as powerful as Arecibo's couldn't raise her? And how could any hacker, no matter what his or her technology, turn her around and bring her back to Earth?" He paused to let it sink in. "The answer is, they couldn't."

"Maybe they're only making it *seem* as if she's coming back to Earth," said Santiago. "Maybe they've hacked *our* system and the diagnostics just didn't pick it up."

"Then they would have had to hack all the Follow-Up Detection Systems we used too. That's four separate installations all together." Kurt closed his eyes and sat back in his chair.

"We're talking ETs, now, aren't we?" said Kinsella.

Kurt turned to stare at him; the Arecibo side of the connection was silent.

Kinsella's eyes blinked behind their oval lenses. "Well, good Lord, Kurt. When you eliminate all the other possibilities what are you left with? Isn't this what you SETI guys have been working for all these years?"

"He's right, Kurt," said Gita. She laughed nervously. "This could be it."

"It," repeated Kurt.

"But *why*?" asked Santiago. "Why would—well, *aliens*—talk *baseball*?"

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"Maybe because *we* do," said Kinsella softly.

"But we *don't*," said Santiago. "We speak mathematics—"

"Baseball *is* mathematics. And it's geometry, and music, and poetry, and art. Art made of time and space and motion. Sunlight and grass and earth. Maybe they even *play* baseball back where they come from. Or maybe they've been picking up broadcasts from Earth and the beauty and perfection of it just . . . enchanted them so much they had to come here to see."

Gita said, "You wrote that baseball was too perfect to have been created by human beings—that God must've had a hand in it."

Bill blinked at the speakerphone, wishing the lady scientist were there so he could see her smile. "You've read my stories."

"All right," said Kurt. "Let's assume that an extraterrestrial intelligence is using Pioneer to talk to us. What are they trying to say?"

"If you send it, we will come?" suggested Kinsella wryly.

Gita stifled another giggle. "I think Mr. Kinsella's right. I think maybe they've just adopted a language they think we'll understand."

"Or maybe they think baseball diamonds have some sort of religious or political significance," said Santiago.

"Don't they?" asked Kinsella.

"Let's have that discussion later," interrupted Kurt and Gita said: "Maybe they think they're grounded spacecraft. Some of them *look* like spacecraft."

"Whoa!" Santiago's voice rose half an octave. "Kurt, she's sending again. A whole different set of numbers. Oh, man, she's . . . Wow. Double-check this with the Signal Detector at Lick, would you? Gita, get on line with, um, with Parkes, okay? This is wild. Kurt, this signal's coming from inside the orbit of Jupiter."

Kurt swung around, catching the eye of one of the tensely hovering observatory staff. "Can you check that telemetry?"

The woman nodded, wide-eyed, moved to a terminal, and brought up Lick Observatory's Signal Processor. "Have him send coordinates."

"I heard that," Santiago said. His fingers, tapping across his keyboard, sounded like the clatter of dice in a cup.

Roll the bones, Kurt thought.

"Okay, listen," said Santiago. "I'm going to send you the first sequence of numbers. See what Mr. Kinsella makes of them. They don't mean a damn thing to me."

The numbers rolled down the screen, pulling scientist and writer close enough to bathe their faces in its light.

1/2.40
2/.302
3/.311
4/.250
5/.330
6/.279
7/.289
8/.350
9/.306

"There's a full second pause between the first number in each group—the ascending numbers—and the rest. That's what I've indicated with the slash. There's a three second pause between each set. I notice the first number seems . . . out of keeping with the others."

"They look like batting averages," said Kinsella. "Except for the first one, which looks like a pitcher's ERA. That'd be my guess."

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"I think you've had more than enough guesses, Mr. Kinsella."

Kurt turned to see Peter Grace standing in the middle of the lab, looking windblown and harried.

"I think," Grace continued, smoothing his hair, "that it's time you gave science back to the scientists."

"What were you thinking?" Grace asked when he'd closed the door on the borrowed conference room. "Letting a *civilian* take control of the situation? That's nuts."

"It was working."

"Oh, come on. For all you know, this could be a monumental hoax."

"Hoax? Perpetrated by whom, Peter? A Canadian fiction writer? You can't hoax a FUDD. Parkes and Lick both confirm—Pioneer 10's signal is now coming from local space."

"Right. Meaning that your friend may have precipitated an attack on us by . . ."

"By what? A bunch of geeks with a fleet of daisy-chained Pentiums? You can't have this both ways. Either it's incredibly sophisticated hoaxers, or it's . . . it's what we've been waiting for, working for, *praying* for all these years. First contact with an alien race." Kurt had to force himself to breathe.

"Who are interested in old baseball diamonds."

Kurt shook his head. "Life's strange, isn't it?"

"It's time to stop playing games and call in the people who know how to handle this sort of thing."

"And who would that be? The CIA? The FBI? Interpol? The Marines? The cast of the latest *Star Trek* series stands a better chance of handling this right than any of them. At least they've dealt with this situation in theory."

Grace's face reddened. "Regardless, I . . . I've taken the precaution of alerting the State Department."

"And told them what?"

"That an unidentified spacecraft is heading for Earth with unknown intentions and that it has expressed some interest in a number of major American cities."

"It expressed interest in major league ballparks."

Grace snorted. "If I'd told them that they'd have laughed me off the line. Look, Kurt, you and I both know that Pioneer 10 can't possibly be hurtling toward Earth under her own power, nor is there any natural phenomenon that could account for it. Whatever the interest is, we are soon going to face an unknown . . . intelligence."

"All right. So the military is involved. What's next? What do we do?"

"We keep Pioneer—whatever it is—talking. Now, I think we have to lock this project down. No press conferences, no more media coverage, no one talks to anyone outside of this lab. In fact, no one *leaves* this lab. We don't want to cause a panic."

Panic. That was something Kurt hadn't considered. He had gone from curiosity to intellectual challenge to giddy anticipation without considering the reaction of the non-geek majority of human beings.

"No one leaves," he agreed.

Left to his own devices, Bill continued his conversation with the scientists in Puerto Rico, mulling over the sequences of data, trying to figure out what they meant.

"So," Santiago asked, "how do you figure it's batting averages and a—what did

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you call it—an ERA?"

"Earned Run Average," said Bill. "An ERA is the number of runs a pitcher allows per nine innings. So this pitcher allows 2.40 runs every nine innings."

"Okay, but why are you so sure that's what this is?"

"Context, first of all. In baseball, each position has a number. Pitcher is one, catcher is two, first baseman is three, and so on all the way out to right field, which is position number nine."

"Oh, okay. I think I—"

Gita's voice cut across him with "Oh, *wow*."

"What?" Bill asked. "What?"

"She's changed again. She's sending . . ."

"Damn!" Santiago's expletive coincided with the sudden appearance on the computer screen at Bill's elbow of a perfect outline of the United States. Within the map's glowing tracery, a pattern of bright dots lit up the dark interior.

Bill shuffled through the papers littering the desktop, finally coming up with a printout of the map Santiago had created earlier from the transmitted coordinates. A glance confirmed the match. This was the same map, only brighter, clearer.

He looked back at the computer screen. The dots had begun to flash. One by one, they winked off, then on again: Boston, Detroit, Chicago, New York, Milwaukee . . .

Hair stood up on the back of Bill's neck. "You flashing those lights, son?"

"No, sir. She . . . it, whatever it is, it's got direct control of the receiver. It's in the driver's seat, now."

"Is Kurt there?" Santiago asked, his voice tight and anxious.

"Nope. Still closeted with that NASA guy. Look, Sandy—may I call you Sandy? Kurt isn't here and Pioneer needs an answer. And I think I got one. Will you send it?"

"If Dr. Costigyan okays it—"

"It's a repeat of an earlier message, so he's already approved it."

"A repeat?" said Gita.

"Yeah."

"Kurt's not available; I'm his second; I'll approve it," she said.

There was a moment of silence, then Santiago said, "Okay, Bill. What am I sending?"

"He *what*?" Peter Grace sat heavily in the swivel chair, rolling backwards several feet before coming to a stop against a workbench.

"He had us repeat a sequence," said Santiago, "from an earlier transmission. Then he excused himself and took off."

"Why?"

"Why'd he take off?"

"Why repeat the sequence?"

"Oh. Because of the map."

"The map?"

"They . . . she . . . Pioneer sent a map of her own. Should still be on screen over there."

"They sent this?" asked Kurt, leaning over Grace to see the screen better. "It's not our construct?"

"What you see is what we got. They're apparently quick studies tech-wise. They drove this right through our MCSA."

"Oh, God," murmured Grace.

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"Anyway, Bill had me send the sequence and—"

"Whoa, that was quick," said Gita.

"Oh, God," said Grace a second time. He pressed a finger to the map where a lone spot of brilliance now blinked steadily. All the others had dimmed.

"Which sequence did you send?" Kurt asked.

"The third sequence."

"The signal, Sandy. Where's the signal coming from now?"

"Approaching Saturn's orbital plane. At that rate—"

"Sometime tomorrow," Kurt finished.

The National Guard arrived first, elite units sealing off streets and rerouting traffic. It was an above-average spring day for Chicago, less blustery than usual. Clouds chased each other across a cerulean sky—they'd have no trouble seeing whatever was descending upon them; be it the remains of Pioneer 10 or an alien ship.

An alien ship. Kurt tried on the thought for size—wasn't sure how it fit, after all. He was almost ready to believe this was an elaborate hoax. Something they'd simply not anticipated when they built all their security protocols and firewalls. Something loosed on them by a particularly clever hacker who'd been able to hijack their Signal Detection System and completely flummox two FUDDs . . . and the NASA tracking computers, and the sophisticated radar arrays of any number of nations whose every attention was on the object—much larger than the hapless Pioneer—currently on an obviously controlled descent to Earth.

Kurt shook himself. No, he wasn't ready to believe that, after all. Occam's Razor cut this particular pie such that the big half went to ET. And yet, he irrationally half-hoped it was a hoax. He had to wonder why, after all these years of daydreaming, anticipating, even praying for contact with THEM.

He looked up now into the cloud-draped expanse of heaven and prayed none of the fighter jets assigned to fly escort for anything that entered Earth's atmosphere contained trigger-happy pilots.

He thought it was a bird soaring high overhead when he first saw it, but a second later, he decided it was a helicopter. Then he realized it was neither. He straightened from the hood of the Army Jeep he'd been leaning against, catching peripheral movement as the soldiers around him stirred. Peter Grace, who'd been sitting in the Jeep monitoring radio traffic, slid out of the cab and stared skyward with everyone else.

It descended swiftly, wavering not at all, bracketed by fighter jets. A deep thrumming filled the air, audible even beneath the scouring roar of jet engines. The fighters had to pull up when the alien vessel—the *alien vessel*—continued to descend toward the corner of Addison and Wheatland.

Kurt devoured it with his eyes, his heart galloping wildly beneath his Kevlar vest. It wasn't saucer-shaped, or cigar-shaped, or ice-cream-cone-shaped, or bristling with instrumentation. It was a perfect sphere of light-sucking black and had no distinguishing marks on the exterior except for . . . Kurt squinted at the image that sat at about the equator on the side the ship presented to him. It looked like a *face*. But before he could catch more than a glimpse, the huge black ball had dropped into Wrigley Field like a pop fly into a fielder's outstretched glove.

Kurt found himself being swept along in a group that included Peter Grace, a four-star General named Garner, a tactical expert named Quinn, and a couple of sharpshooters. Walkways, staircases, and corridors unfolded in a blur as they made their way into the park through an access that brought them out behind the

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home dugout.

They came up short along the railing, staring at the alien vessel. It hovered above center field, a ramp extending down to the grass. A man stood at the bottom of the ramp, looking up. He wore an unfamiliar baseball uniform with a royal blue cap. A collar length mane of white hair stuck out from underneath.

"Who—" General Garner began.

"Kinsella," Grace growled. "We need to get him out of there, the damned idiot."

"No, wait." Kurt put up a hand. "It may be all right. I . . . think he may speak their language."

Peter Grace gasped, pointed. "The ship!"

Around them, the sharpshooters tensed. A figure had appeared at the top of the ramp, and now proceeded down it, out into the sun. It was shorter than Kinsella, but had two arms, two bandy legs, and a slightly too large head with a pointed face. It was followed by a small squad of similarly built beings, all of which differed slightly in size and shape. Like most of the people currently in the confines of the ballpark, they were wearing uniforms—baseball uniforms.

Even as Kurt took that in, Kinsella reached out to shake hands with the alien leader and waved expansively at the field. They seemed, incredibly, to be exchanging words. Then the alien repeated Kinsella's gesture and, without hesitation, the crew of the alien ship trotted across the outfield to the visitor's dugout. From the home dugout, just below where Kurt stood, exploded a squad of human players, racing to take positions on the diamond.

"What the hell is going on here?" asked General Garner, his voice barely above a whisper. "Are they—are they going to *play*?"

"It certainly looks that way." Kurt found himself tipping toward giddiness again. He could just see the headlines: *Aliens Visitors On Field of Dreams!* or *ET Goes the Distance to Play Ball!*

"We got a small problem."

Kurt looked down over the railing. Bill Kinsella stood just this side of the on-deck circle, grinning up at him. The blue cap sported a gray, heart-shaped alien face, the top of its head stitched like a baseball. Across the front of his uniform the words *Las Vegas* were embroidered in blue and silver.

"What uniform is that?"

"Huh? Oh—Las Vegas Area 51's—Dodger Triple-A affiliate. They were out here for an interleague against the Iowa Cubs. I tried to get the Major League Cubs, but they were down in Florida against the Marlins. (Stupid name for a ball club, if you ask me.) But this—" He flicked the bill of the ET-bedecked cap with a fingertip. "This was a real serendip, finding the Area 51's right next door."

"But how did you. . . ?" Peter Grace gestured at the field, from which he seemed unable to take his eyes.

"I've got friends in baseball," Kinsella said. "I made some calls from the taxi." He shrugged.

General Garner spoke now, his eyes on the alien players. "These . . . people . . . came all the way from . . . wherever they came from—"

"Oh, um, out Taurus way, manager said."

"Out *Taurus* way?" repeated Grace. "He *said* that? In *English*?"

"Well, he started out in Japanese, I think, then switched to Spanish. I don't speak Japanese, and my Spanish is pretty shaky, so he went to English when he saw I wasn't getting him. Spoke it pretty well, too. Hardly any accent. A little trouble with the letter 'p,' maybe. Seemed as if his Japanese and Spanish were pretty good too, though not speaking any, I couldn't say. Anyway, I'm pretty sure he said

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their star was out Taurus way. They've had their eye on us for a while, he said. Or maybe 'ear' is a better choice of words. They've been listening in to space chatter, TV and radio broadcasts—that sort of thing—trying to figure out how to communicate with us."

Grace moved his head slowly from side to side like a man trying to shake off a gnat. "Did he explain why they chose baseball?"

Kinsella tugged at the bill of his cap. "Not as such. They've been picking up our baseball games, of course—trying to figure out our rules, he said. But when I asked how they came to be playing baseball in the first place, he just blinked at me and repeated the question. Didn't figure we were going to get anywhere after that, so I suggested we play ball."

Kurt looked up at the sharp sound of a ball smacking a catcher's glove. An odd tingle of memory took him. A memory of sultry summer afternoons that passed in a timeless haze of cheers and chants, popcorn, peanuts, and hot dogs, all punctuated with the cries of hawkers and the crack of the bat meeting a little lump of horsehide.

Kurt dragged his eyes away from the gray-skinned batter who had taken his place in the on-deck circle to take his practice swings. "You had a problem, you said."

"Well, seems they didn't bring any umps with 'em and ours didn't believe me when I told them where we were going and why. So, we were hoping maybe among the troops here, there might be some folks who'd be willing and able to umpire the game."

"I've umped at my daughter's little league games," Kurt said. "Usually behind the plate."

Bill Kinsella's grin deepened. "Great! I'll bet we can scramble some gear up from the clubhouse."

"Actually, all I need is a mask. This helmet and Kevlar ought to do fine for gear." Giddiness washed over him again.

Kinsella was looking up at Garner now. "General, care to spare a couple of your soldiers?"

The General finally managed to look away from the spectacle on the field. "You're serious?"

"Well, we've got home field advantage, which means we play by home field rules. Rules say: in order for this game to be official, we need umpires."

"You want U.S. Army troops to umpire an alien ballgame?"

"Well, not troops—we only need four—and an official scorekeeper, of course. The rest can watch."

"Watch?" He swung his eyes to Grace. "Dr. Grace, you're the space program expert. Your opinion of these proceedings?"

Grace seemed dazed. "These . . . people don't seem dangerous, General. But the situation is . . . well, it's unprecedented, and probably does bear watching."

The General's brows rose.

"What would *you* do?" Grace asked. "Capture them? Ignore them? This is First Contact, General Garner. That means it's never happened before. There are no rules of engagement. There are no precedents. I guess we'll have to set those as we go along."

"Well," said Garner, eyes going back to the sunny diamond. "They seem to pose no immediate threat. Under the circumstances, I suppose participating in a ritual of the visitors' choice might be appropriate." He swung around to the tactical officer beside him. "You ever do any umping, Tommy?"

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Kurt didn't wait to hear the answer. He was already over the railing and into the dugout. Bill Kinsella met him there, handed him a catcher's mask, and walked him to the plate. He nodded to the Area 51's catcher, who flashed a brilliantly white smile from the depths of his mask, then turned to receive the last of the pitcher's warm-up throws.

A little painted alien face stared up at Kurt from the back of the catcher's helmet. He glanced up at Kinsella, already on his way back to the home dugout. "What do the visitors have on their caps?"

Bill touched his own headgear above the bill. "Same as ours. Alien faces."

The visiting leadoff hitter had stepped into the left-hand batters box. Kurt looked at the logo on his helmet. The face was human.

Kurt couldn't be sure, but he thought it might be the same face that was etched into the anodized aluminum plate that had been aboard Pioneer 10. Along with the two human figures, the plaque had carried an etching of the solar system and various mathematical figures that had apparently successfully conveyed the pertinent information about base-ten arithmetic. He made a mental note to recommend a few modifications to the plaque before they sent up their next deep space probe.

The alien ship had withdrawn from the field of play now, moving to hover over the park at a respectful distance, and looking for all the world like a game day blimp. Kurt wondered if the aliens had the technology to transmit the game all the way home. An interleague game, indeed.

He looked out over the brilliant diamond, seeing the home team in their positions, the other umpires taking the field, and a crowd of spectators—mostly in khakis and camouflage—filling the stands. He felt the spring sun warm on his shoulders, smelled the perfume of grass and earth, and perhaps popcorn, though that might have been his imagination.

He did not imagine that unique, expectant hush that had preceded the first pitch of every baseball game since the beginning. He filled his lungs with air and officially opened the first encounter between humanity and beings from another world.

"Play ball!" ■

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Orbiter, Julie E. Czerneda, Trifolium Books, $13.95, 168 pp. (ISBN: 1-55244-020-6).

Burning the Ice, Laura J. Mixon, TOR, $25.95, 544 pp. (ISBN: 0-312-86903-7).

Shadow Puppets, Orson Scott Card, TOR, $25.95, 348 pp. (ISBN: 0-765-30017-6) (leather-bound, $200, 0-765-30475-9).

Probability Space, Nancy Kress, TOR, $24.95, 367 pp. (ISBN: 0-765-30170-9).

The Skinner, Neal Asher, Macmillan, £9.99, 474 pp. (ISBN: 0-333-90364-1).

What Do You Do With a Drunken Sailor? Douglas Morgan, Swordsmith Books (www.swordsmith.com), $9.95, 124 pp. (ISBN: 1-931013-09-8).

Lexicographer's Love Song, Ian Watson, DNA Publications (www.dnapublications.com), $6.50 (includes $1.50 s&h), 60 pp. (ISBN: none).

Contacting Aliens: An Illustrated Guide to David Brin's Uplift Universe, David Brin and Kevin Lenagh, Bantam, $14.95, 191 pp. (ISBN: 0-553-37796-5).

John W. Campbell's Golden Age of Science Fiction, Eric Solstein, $29.95 (DVD), DMZ (dmznyc.com) (ISBN: pending).

The Literature of Science Fiction Film Series, Eric Solstein, $49.95 (2 DVD set), DMZ (dmznyc.com) (ISBN: pending).

Last spring, I was invited to speak at a teacher's workshop on cosmology at the Wright Center for Innovative Science Education at Tufts University, outside Boston. My topic was to be "Using Science Fiction to Teach Science," I developed a suitable PowerPoint presentation (already scheduled for repeat at a couple of cons), and it went well when the day (June 28th) came. More to the point of this column, another speaker at the workshop was Julie E. Czerneda, an SF writer and science educator who has developed a series of anthologies for use in schools. The series began with *Packing Fraction*, which contained five stories by Charles Sheffield, Jan Stirling, Robert J. Sawyer, Josepha Sherman, and Czerneda herself. The latest is **Orbiter**, with five more by Eric Choi, Annette Griessman, Mark Canter, Jean-Louis Trudel, and Anne Bishop. As before, the point is to illuminate themes in elementary science education. Bishop's "A Strand in the Web" deals with the complexities of ecosystems, which require a balance of eater and eaten, how easy it is to upset the balance, and human responsibility. Trudel's "Tether" deals with a novel way to generate electricity (actually tested in a Shuttle experiment) that illuminates the relationship between magnetic fields and electric current. Reading levels are suitable for grade-school readers, and the stories' tone and complexity are reminiscent of 1940-1950 *Astounding*.

Czerneda's anthologies come with companion books for the teachers, offering loads of exercises to get the kiddies thinking. She demonstrated a few at the workshop: one involved handing out slips with science-related headlines on them and asking folks to imagine implications; my group got "Canadian Scientists Discover Proto-Beaver" and had great fun imagining a fossilized men's magazine.

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Okay. Stop snickering. That's what she told us, too, and then she moved on, just as I must here.

Why me? Why Julie? Well, we're both judges for the Webs of Wonder contest (http://www.analogsf.com/wow/main.html), jointly sponsored by *Analog* and David Brin (who has provided the prize money). The contest's aim is to foster Internet sites that combine teaching with good science fiction, in the process generating "new resources for educators, using distinguished science fiction stories, novels and films to complement regular curriculum materials, helping teachers spark enthusiasm and convey difficult subjects in the classroom."

Why bother? If you haven't noticed, SF is more popular than ever—in the forms of TV, film, and video games. But the SF readership is aging and declining in numbers. It has been suggested that this is in part due to the field's failure to recruit new readers, and the contest—and my and Julie's efforts at the workshop—is an attempt to get SF into the schools, get the kids hooked, and rejuvenate the field.

We probably can't hope to do as much good as J. K. Rowling, though. When my fiancée and I went to see the Harry Potter movie with her nephews, it was a wonder to see the boys saying afterwards that the book was better. Rowling is making kids want to read.

Laura J. Mixon (last reviewed here in January 1999, for *Proxies*, "a thriller with brains") has a new novel out, and **Burning the Ice** is well worth your attention. The setting is Brimstone, a frozen world that apparently once had life—there is oxygen in the frigid air, though the colonists need breathing masks, and there is fossil fuel. The colonists dwell in deep caverns. Beneath kilometers of ice there are deep seas, and there roam the waldoes controlled by young Manda, a solitary misfit in a world of clones.

Clones? Reproduction is in vats, in a sort of batch mode, so that each "birth" delivers two or more built from the same template (which can be reused later on—clone groups have members of all ages, though vat-mates have a special bond). Manda's vat-mate died before birth, aboard the *Exodus*, the ship that brought the colonists and then supposedly moved on to another star, and Mixon hints early on that there was more to the tragedy than simple fluke. Growing up, Manda was a misfit, picked on, angry. Now she chooses solitary work whenever she can, and the exploratory waldoes are her special project, searching for hints of life beneath the ice, for vent-systems, for the sources of the strange noises the waldoes sometimes hear.

And then she is visited by a ghost. Well, not quite. The colonists are plugged into a computer system that lets them see data, controls, and others as if they floated in the air, not on screens, and the computers are powerful enough to run programs called syntellects. One such syntellect is Ur-Carli, a digital version of Carli D'Auber, the elder who came with the vat-grown colonists from the ship and mentored them until she vanished. Occasionally Ur-Carli dons a virtual avatar or even a humanoid waldo to interact with the colonists. Now such an avatar leads Manda away from the networked portions of the colony's cavern home to a frozen room equipped with a telescope and a view of the sky. Carli's mummified body is in a neighboring room.

When Manda wants to reveal the body to the rest of the colonists so Carli can have the honor due upon her death, Ur-Carli says no: "You mustn't tell anyone. There's a reason. I know other secrets also."

Meanwhile, aboard the *Exodus*, the crèche-born, the originals of the colonial clones, sheltered in tanks while they live prolonged lives in virtuality, reveal nasty plots and schemes. They are not on their way to another star at all. They

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await the terraforming of Brimstone and the moment when they will return and take over. The colonists will be slaves.

But they don't know that. Nor will they till well after Manda discovers intelligent life in the seas, loses a waldo, struggles to rescue it before its antimatter containment can be breached by inquisitive alien tentacles, and discovers that something is interfering with her control of the waldoes. When a quake shatters the caverns and destroys far too many essential resources, she struggles with the rest to rescue the buried and salvage the ruined. She uses the hidden telescope, discovers a secret herself (one that makes her think help is available), tries to tell the governing council, and is hushed up. She finds love and nearly loses it.

And then . . . the crèche-born are not happy about Manda's sub-sea discovery. They want a world for themselves, one they have to share neither with other humans nor with aliens. They are schemers and manipulators and hackers to boot. But Manda has talents, and she is learning that despite the estrangement she has always felt as a singleton, she has capable friends as well. The battle is joined, and the outcome . . . You can imagine it, or you can buy the book and read it. I recommend the latter. Mixon has done an excellent job of imagining a world of ice, a society of clone-groups, a heroine who comes nicely alive for the reader, and a unique alien. Enjoy.

In recent years, Orson Scott Card has been taking advantage of the fame he earned with *Ender's Game* (reviewed here July 1985) by following the adventures of Bean, the spunky little genius who infuriated the psychopathic Achilles so badly that after Ender had won the war and left for the colonies, Achilles had the rest of the Battle School brats kidnapped. Bean, in service to Ender's brother Peter, the Hegemon, defeated him, but only temporarily. Achilles had a way of landing on his feet; he could flee the collapse of his schemes in Russia to India, flee India to China, and with China ruling a large swath of the world . . . See *Ender's Shadow* (reviewed January 2000) and *Shadow of the Hegemon* (April 2001).

And here is **Shadow Puppets**, beginning as Peter Wiggin receives a message that a certain personage needs rescuing from China. Bean, tall now but doomed to a short life by the genetic tweaking that made him what he is, sees the trap: Achilles cannot be trusted; just when Peter thinks he is most under control, he must plan to spring a trap and bring all down. He and Petra, who loves him, immediately resign from the Hegemon's service and flee, hoping to survive long enough to prepare a plan that will save the day. Petra has a hope of her own—to persuade Bean to marry her and let her bear his children. Meanwhile, their friend Virlomi also flees the Hegemon's employ to raise in India a subtle rebellion against the Chinese conquerors. Here is a fertility lab run by a demon from the past, and most of Bean's precious children are lost. Here is an Arab League ready to retake its rightful place among the world's rulers, led by a caliph who was once at the Battle School with Bean and the rest. Here is war, the defeat of evil, a renewal of promise in Bean's soon-to-be-child, and . . .

The defeat of evil? Is the series over? Well, there are those missing embryos, and evil is a weed that is impossible to kill. Perhaps the next will pit Bean's children against each other.

When Card started writing of the *Shadows* of Ender Wiggin, some thought him lazy, riding his own coattails. But the shift of focus has been fruitful, and a true dynastic saga may be about to unfold.

Nancy Kress began an interesting series three years ago with *Probability Moon* (reviewed here October 2000), which involved a world (known as World) whose natives' brains reacted

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badly to disagreement. Society was therefore based on consensus—at least until humans showed up, exploring a universe opened to them by the space gates left behind by an unknown elder race and hunting for a solution to the Fallers, a species that attacks on sight, as if it cannot abide the thought of sharing the universe with any other intelligence, and refuses to talk (prisoners even commit suicide at the very first opportunity). In *Probability Sun* (reviewed January 2002), humans discovered that the local consensus hang-up was due to the way local brains were being affected by an alien device buried in the mountains. Since the device offered a defense against the Fallers, it was promptly removed and dragged off to help with the war—and never mind that on World consensus just as promptly collapsed and the rules of the jungle held sway once more. Also never mind the crucial insights of ace physicist Tom Capelo, who figured out that on one setting, if the Fallers used their own device on the same setting, the universe would be destroyed.

Characters familiar from the first two books populate **Probability Space**, which opens as Tom Capelo's daughter Amanda, age fourteen-going-on-twenty, takes advantage of daddy's absence from the house to try on her late mother's dress. Daddy returns unexpectedly, she hides, and then daddy is kidnapped. Being a smart kid, she flees. Unfortunately, she immediately falls into the hands of a rebel group who actually decide to help her along, first to the Moon, where she tries to find the Sensitive Marbet, and then to Mars. Meanwhile, Marbet and Lyle Kaufman are trying to get back to World. And a military coup, led by Pierce, a man who would gleefully use a twelve-gauge shotgun to kill flies in his bedroom, is in the works.

A shotgun to kill flies? Would Pierce really take the Protector Artifact to Faller turf and activate it at the most dangerous setting? Would he really risk the universe? And is there any way to stop him?

While Amanda manages to survive the wrecking of large parts of Martian infrastructure and make kissy-kissy friends with the scion of a Greek gigafortune, Lyle and Marbet do their damnedest. And if the war with the Fallers thereby comes to an abrupt end, it isn't the end anyone could expect. Certainly not ace physicist Tom Capelo, whose equations are not perfect. Nor the great negotiators Lyle and Marbet, who, says Capelo, look like snake-oil salesmen beside the brilliant deceiver who saves the day.

As usual, Kress is brilliant. One of our best. Don't miss.

I didn't see British writer Neal Asher's first novel, *Gridlinked*, but Macmillan sent me his second, **The Skinner**, and I want to tell you this fellow has success written all over him. If he keeps it up, you have a lot of reading pleasure ahead.

The setting is the world of Spatterjay, named after Jay Hoop, who with his seven cohorts established an unprecedented record of bloody savagery made possible by two factors: the world itself and the alien Prador.

First, the world: Spatterjay's life-forms are infected by a "virus" that makes it possible for them to regenerate lost flesh. The virus is so effective that fishermen rip the meat from their catch and throw back the head and spine to regrow the rest of the body! It works for humans too, and the longer one has been infected, the stronger one becomes and the harder it is for anything to kill you. Wounds close immediately. Lost limbs regrow. And it's a good thing, too, for Spatterjay's dominant predator is the leech, which gloms on, chews out a circular plug of flesh, and leaves the prey to regrow the plug. Humans don't appreciate being forced to donate to the food chain, so they tend to stomp the leech if they get a chance, grab the plug, and screw it back into the hole.

Pain remains, though. Since Jay Hoop and his friends doted on pain, they

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thought Spatterjay quite an idyllic spot. They could seize the local residents and torture them endlessly, chortling all the while.

Second, the Prador: These crab-like aliens lose their limbs on adulthood. Their young, enslaved by pheromones, serve as arms and legs. So can human beings, if their brains and spinal cords are removed ("cored") and replaced by cybernetic thrall units. Jay Hoop et al. discovered that there was a lucrative trade in capturing people, infecting them with the virus so they would heal properly, coring them, and selling them to the Prador. Since the rest of humanity objected, there was a war. The Prador lost, and Spatterjay was cleaned up, though Hoop et al. managed to disappear.

Now the war is centuries past. Spatterjay's locals are known as Hoopers, and the virus is for sale to all who crave immortality. And arriving at the port is the reif ("reification") Sable Keech, a dead man animated by serum, motors, and AI, once a lawman who hunted Jay Hoop's dread crew, now a hunter on the trail of Jay Hoop himself, who rumors tell became the Skinner of the title, a monster whose head lives in a box aboard a Hooper ship and whose body roams an island. Also arriving are Erlin, a scientist looking for a reason to keep on living (immortality is booorrring!), and Janer, a man who serves the Hive (plain old Earthly hornets turned out to have intelligence; now they roam the galaxy).

Erlin and Janer are soon off on a Hooper ship, looking for Erlin's old friend Ambel, an old captain so long infected by the virus that he does not even bleed when cut. It isn't long before Keech is attacked by hired assassins, and then Asher puts on display the Prador chieftain who was once Jay Hoop's main customer. Now the Prador chieftan, Ebulan, is arming Hoop's one-time lover Rebecca Frisk, whose taste for sadism is no whit diminished by the centuries, to hunt down Keech. But Ebulan has other schemes in mind as well, and everything must culminate on Skinner's island.

There is inventive world-building, plot with momentum, action in plenty, characters with pasts and complex motivations. But the most interesting character of all may be the antique war-drone Sniper, who sasses the warden AI that supervises Spatterjay, confronts the Prador warbots with insouciance, and in the end finds a kind of apotheosis.

Watch for this one.

Want some fun? Get **What Do You Do With a Drunken Sailor?**—it is a collection of quite unexpurgated sea chanties with historical notes by Douglas Morgan, longtime naval officer and author of the thriller *Tiger Cruise*.

What does "unexpurgated" mean in this context? Here's a mild example:

Exhaustive experimentation
By Darwin and Huxley and Hall
Has proved that the ass of the hedgehog
Can hardly be buggered at all.

Why do I mention it here? Perhaps it is enough to say that Morgan is the pseudonym of a certain well-known SF writer. If not, well, it's a fun book anyway.

For a different sort of fun, try Ian Watson's **Lexicographer's Love Song**. Watson is well known for his novels and—most recently—his work on the *A.I. Artificial Intelligence* movie. This is his first collection of poetry, and the title piece alone is enough to prove him a master of wordplay. If that is not enough, the rest show that his view of the world is as skewed as anyone's outside the rubber room.

David Brin's "Uplift War" series—from *Sundiver* (reviewed here in June 1980) through *Heaven's Reach* (October 1998)—has proven very popular. Its books have won awards, and the publisher can tout it with a straight face as

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"one of the greatest achievements in science fiction history." Surely, if it had been published in the '50s or '60s, it would share the same altar as the works of Asimov, Heinlein, Dickson, and Clarke.

So here, for the legions of Brin fans, is **Contacting Aliens: An Illustrated Guide to David Brin's Uplift Universe**, wherein Brin describes and Kevin Lenagh draws the Tandu and Gubru, Bahtwin and Thennanin, Tymbrimi and Tytlal, Luber and Puber, Soro and Synthians, and more. Get this one to keep bodily configuration, biology, sociology, and history straight as you reread the canon and struggle to make sense of the galactic political circus that makes life difficult for humans and their uplifted "clients"; dolphins and chimps.

Eric Solstein and his Digital Media Zone (DMZ) have released two DVD products of considerable interest. First is **John W. Campbell's Golden Age of Science Fiction**, which includes video of Campbell talking about his work and Campbellic reminiscences by such Golden Age writers as Isaac Asimov, Hal Clement, Harry Harrison, Frederik Pohl, Brian Aldiss, James Gunn, and Jack Williamson, and comments by his editorial successors Ben Bova and Stan Schmidt. It also includes a film, "Lunch with JWC," made by James Gunn to show the editor at work over lunch and whiskey with Harry Harrison and Gordon Dickson. Since several of the reminiscers—as well as Campbell, of course!—are no longer with us, this is a must-have for anyone interested in the history of SF.

So is **The Literature of Science Fiction Film Series**, which restores ten films produced by James Gunn in the early '70s covering Forrest Ackerman, Poul Anderson, Isaac Asimov, John Brunner, Gordon Dickson, Harlan Ellison, James Gunn, Damon Knight, Frederik Pohl, Clifford Simak, and Jack Williamson discussing the history of the field. You can see excerpts at http://dmznyc.com/html/cssf%20films.1.html. □

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BRASS TACKS

Dear Dr. Schmidt,

I just finished reading "In Spirit" by Pat Forde, in the September 2002 issue. I have been a subscriber to *Analog* for at least the last five years, and probably off-and-on for the last ten. I am still in tears. I have never reacted to a story as strongly as I have reacted to this one. I want to nominate this story for the Hugo award. It combines the best of hard sci-fi with a humanist orientation that grabbed me from the very start. The destruction of the World Trade Center towers on September 11, 2001 was an event that captured world audiences. However, like so much of television, the broadcasts could only provide an observers point of view. I am not sure why, but I deeply suspect "desensitization" and "repetition" as the primary culprits. So much violence is depicted with exceptional realism on today's TV channels that the "real thing" does not eclipse fantasy.

Pat Forde has managed in words what live video could not convey. In reading the episodic visitations to the past of the protagonist, Raed, a co-conspirator of the 9/11 tragedy, I felt myself connected to the raw emotions of the heroes, victims, survivors, and perpetrators of that event. And also to the inner evolution and questioning that Raed was going through. This story presents a "Rosetta Stone" of the psyche, a key to unraveling the tangled knot of psychosis. I felt myself lifted in the hope of salvation and frozen in the sympathetic pain of empathy (I just started crying again).

I treasure the time I spent reading the story and intend to read it again and again—and think about how the right key might be the salvation of so many souls.

Ron Sonntag

Dear Mr. Schmidt,

This is my first time writing a letter to any magazine, literary or otherwise, but never in my twenty-three years have I read a story so moving as to force me to.

In September 2002 issue of *Analog*, you printed a story titled "In Spirit" by Pat Forde. My only complaint was that a warning would have been nice . . . running into such emotionally charged material so unexpectedly was a bit of a shock.

I sat in a restaurant, eating my lunch, with tears running down my cheeks. I had to set the magazine down periodically to catch my breath and clear my eyes to allow me to read the text.

Forde has rendered this story beautifully. My initial reaction upon coming across the telltale "9/11" was "How truly tasteless and exploitive." Then I read the story.

Thank you, Pat Forde. All of our lives have been forever altered, and this poignant look into the events of that day bring home exactly how tragic the situation is. It also shed a beautiful light of hope on everything. Its been nearly a year now, and even writing this letter is enough to bring me to tears. Even my notoriously apathetic generation has been touched by this event.

As difficult as it was for me to read this story, I can only imagine how difficult it must have been to write it. Thank you for doing so.

I haven't been reading *Analog* long—all of three or four months—but I have

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already decided that this issue will remain close to my heart for a very long time.

Thank you.

Heather Dudley

The author responds . . .

Heather, thanks for your heartfelt letter. "In Spirit" certainly was an emotional tale to write (but Stan did give a warning regarding its intensity in the In Times To Come column).

Like many North Americans, I was sitting on my couch eating cereal and watching the news when a breaking report came about a plane hitting the World Trade Center. I then saw Flight 175 strike the south tower live, and saw both towers collapse before my eyes. I started writing "In Spirit" four days later, in an attempt to cross the surreal gulf between me, sitting there with my uneaten cereal in front of the TV . . . and the thousands of people I watched die that morning, in those planes and in those towers. That gulf swallowed millions of other viewers around the world, all those of us who weren't there in New York.

Heather, I knew that a few might consider an SF story about 9/11 "tasteless and exploitative," but hoped "In Spirit" might drag my potential readers and my main character across the gulf of surreality that terrible morning opened up. Metaphorically, the main character of "In Spirit" is stuck on the wrong side of the TV screen throughout the story, just like most of us were that morning. I wanted to see if I could get him—and all of us—to penetrate the Hollywood-like images of fireballs and crashing towers that were played and replayed on TV, and to search for a universal truth deeper within the tragedy.

I'm glad so many readers found one in this *Analog* story.

Pat Forde

Dear *Analog*,

I found your story, "In Spirit", to be in bad taste. Not only does it commercialize on the worst day of our nation's history (9/11), it also commercializes the thousands of lives lost to the senseless act of terrorism. Thousands of people across the country will open your September issue only to find a painful reminder of what was most likely the worst day of their life. And as terrible as that is, I believe there are larger issues involved in this story.

"In Spirit" does not show an accurate representation of terrorists' lives. Our young people will read this story and feel sympathy for the people who terrorized our country. The author has depicted Raed, a surviving terrorist, as feeling heartache for our people. It shows him regretting his decision to bring down The World Trade Center, it shows him longing for the love of his wife and daughter, and it shows him falling to his knees in empathy for the lives he chose to help cut short. There is enough confusion in our world without adding this to it. I do not believe *any* of the men involved in the terrorist attacks care at all about the damage they inflicted. I do not believe *any* of those men would stand at ground zero and feel anything but pleasure over the destruction they would see. Everything I have heard and seen shows the opposite. This author has taken many facts from September 11, 2001 and woven them in with a sorrowful terrorist. It simply isn't right, and it certainly doesn't do justice to the men and women who lost their lives that terrible day.

Karen Mazie

The author responds . . .

Karen, please accept my apology for any offense "In Spirit" may have given. I do feel that your reaction stems from a mistaken assumption: The story's central character is not presented as a terrorist involved in the "decision to bring down the World Trade Center," but rather as a sympathizer to the terrorists' cause who becomes an accomplice.

I based Raed on speculations (pub-

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lished in the aftermath of 9/11) that American friends or relatives of the actual terrorists may have assisted in some small way. My story establishes that Raed is a naturalized American citizen who has spent half his life in the U.S., though he resents his new home and refuses to become a part of it. Other details reveal Raed was a moderate until a few years before the WTC attacks, when the antipathy he harbors toward America allows him to fall under the sway of his cousins—the true terrorists, who I refer to without commiseration.

Of course, Raed is as guilty of mass murder as the men who actually carried out the attacks, and is convicted for abetting a horrific terrorist act. (You'll notice he did not get the death penalty—the court recognized his bit-player stature).

I chose Raed as a central character because he encapsulates the larger problem looming behind the core of radical terrorists: Raed is drawn from the rank and file millions around the world who sympathize with those who would bring the United States down, though they are not hardened terrorists themselves. As the world's dominant scientific, economic, and military power, the U.S. unfortunately inspires a distrust and disdain that attains the level of hatred in some people. This reactionary sentiment appears to have swelled since the end of the Cold War, especially in the West. Anti-Americanism is rampant in major European centers, among some circles in Canada (my country), and can be encountered even in your own country.

With this in mind, I cast Raed as a hypothetical disaffected American willing to assist terrorist-relations from overseas. Raed involves himself in scouting airport security, and puts up his radical cousins for the night, without realizing the scope of what he's gotten himself into until just hours before the attack.

Nevertheless, the story is clear on the matter of Raed's guilt. He had the opportunity to turn his cousins in, but chose not to. And after thirty years of imprisonment, he still feels no remorse for being an accessory to the tragedy. His only selfish regret is the price he paid himself: the loss of his freedom and his family. I paint Raed as dismissive of the deaths he helped bring about; he feels the victims of 9/11 got what was coming to them. This can hardly be called a "sympathetic" portrayal of Raed.

When Raed "stands at Ground Zero" he considers himself blameless. They're not his victims. But the farther Raed progresses through the landscape of the tragedy, the more he witnesses the heroism of ordinary Americans who were caught in it. And the more he finds himself in the shoes of survivors, and later in the shoes of victims, the harder it is for Raed to deny the reality of that day: inch by inch he is forced to let go of the lies about America he's been swayed by, and he begins to see the truth.

I do hope that, upon reflection, you see the message of "In Spirit" is actually one worthy of our young people's attention: that tragic massacres like 9/11 are the result of gulfs of misunderstanding between cultures; and that America must win over those who despise it by finding ways for them to recognize the truth of a great people.

This truth was exemplified by the reaction of New Yorkers during 9/11, which my story is intended as a fiction-memorial to. Indeed, the surprise revelation of "In Spirit" is that it is Americans who give Raed a last chance to find his lost humanity.

That, after all, is the lasting lesson of 9/11: Americans can turn a tragic attack against them into a demonstration of their unconquerable humanity.

Pat Forde

Dear *Analog*,

Regarding "In Spirit" in the September 2002 issue . . .

Two words: Thank you.

Kim Ditto-Ehlert ■

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UPCOMING EVENTS Anthony Lewis

14 - 16 February 2003
BOSKONE 40 (New England SF conference) at Sheraton Boston Hotel, Boston MA. Guest of Honor—David Brin, Artist Guest of Honor—Jim Burns, Special Guest—Charles N. Brown, Featured Filkers—Clam Chowder. Info—Boskone 40, Box 809, Framingham MA 01701; fax—(617)776-3243; boskone@nesfa.org; www.nesfa.org/boskone

21 - 23 February
2003CONDFW (Dallas/Fort Worth area SF conference) at Radisson Hotel Dallas North, Richardson TX. Guests—David Cherry, Brad W. Foster, Aaron Allston, Lillian Stewart Carl, P.N. Elrod, Lee Martindale, Martha Wells. Registration—$20 until 31 December 2002, $25 thereafter. Info—ConDFW, 2183 Buckingham Rd. #282, Richardson TX 75081; info@condfw.org; www.condfw.org.

21 - 23 February 2003
POTLATCH 12 (Pacific literary-oriented sf conference) at Ramada Plaza Hotel International, San Francisco CA. Book of Honor—The Rediscovery of Man, by Cordwainer Smith (NESFA Press). Registration—$40 until 8 February 2003, $45 thereafter. Info—Potlatch 12, c/o Mary Kay Kare, Box 3042, San Ramon CA 94583; info@potlatch-sf.org; www.potlatch-sf.org.

21 - 23 February 2003
SHEVACON 11 (Virginia SF, Fantasy & Horror conference) at Holiday Inn Roanoke Tanglewood, Roanoke VA. Guest of Honor—Hal Clement, Artist Guest of Honor—Daniel Trout; MC—Rikk Jacobs. Registration—$20 until 11 February 2003, $25 thereafter. Info—PO Box 416,Verona VA 24482-0416; 1(540)248-4152; themecon@juno.com. www.shevacon.org.

28 February - 2 March 2003
CONDOR X (San Diego area SF conference) at DoubleTree Hotel Del Mar, San Diego CA. Registration—$35 until 31 January 2003; more at the door. Info—ConDor, Box 15771, San Diego CA 92175-5771; info@condorcon.com; http://members.cox.net/dkeais/condor.

28 August-1 September 2003
TORCON 3 (61st World Science Fiction Convention) at Metro Toronto Convention Centre, Royal York Hotel (and others), Toronto, Ontario, Canada. Guests of Honor—George R.R. Martin, Frank Kelly Freas, Mike Glyer. GoHst of Honor—Robert Bloch. TM—Spider Robinson. Registration—Attending CAD250/USD170, Supporting CAD60/USD40, Child CAD60/USD40. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Info—Torcon 3, Box 3, Station A, Toronto, Ontario M5W 1A2, Canada; email—info@torcon3.on.ca; URL—www.torcon3.on.ca [Note to US readers—first class postage to Canada is $0.60 for the first ounce.]

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